

# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

## Countries presentations



Final meeting of the UNEP/GEF POPs GMP projects  
in the Asia and the Pacific region

**Bangkok, Thailand 4-5 April 2023**



# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

## POPs Monitoring in Cambodia

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific  
region

Bangkok, Thailand 4-5 April 2023



## Cambodia

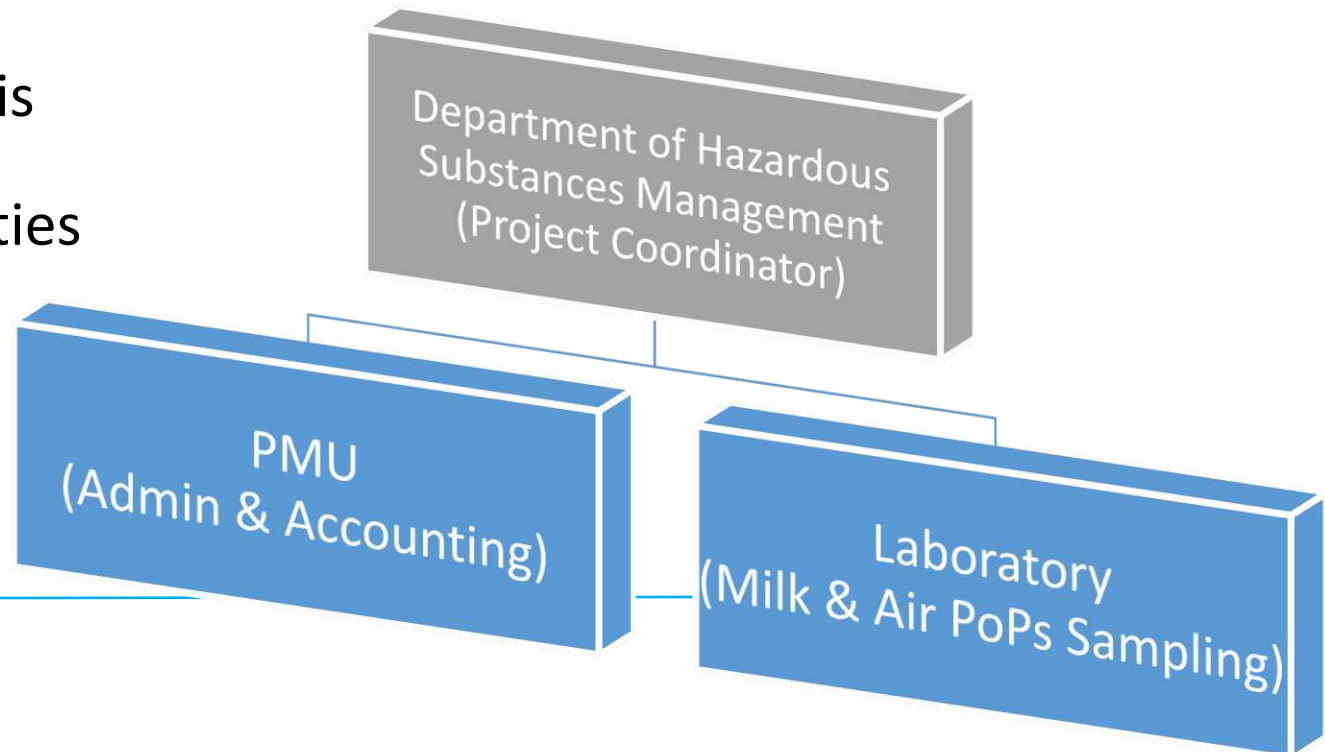
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- The UNEP/GEF project titled “Implementation of the Global Monitoring Plan (GMP) in the Asia Region” is established to respond to Article 16 of the convention, which requires the party of the convention to evaluate the effectiveness of the convention by conducting monitoring the concentration of POPs in the environment and human.
  - As a party of the SC since 2006, Cambodia expressed a strong commitment to join the project implementation in 2017.
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## Cambodia

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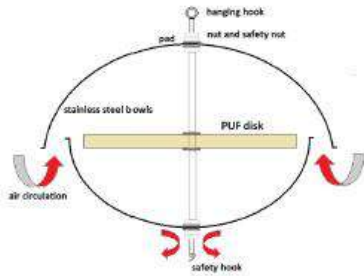
- Under this project, Cambodia has implemented 4 main activities as follows:
  - A. Passive Air Sampling
  - B. Human Milk Survey
  - C. National Sample Analysis
  - D. Capacity Building Activities



### A. Air Sampling (Passive Sampling)

- Tools: Passive Air Sampler (Polyurethane Foam Disk (PUF disk))
  - Site Selection: Sihanoukville Province, a Coastal Province in Cambodia
  - Sampling Schedule: Jan, 2018 to Oct, 2019 (8 PUF Disks+8 sampling times)
  - Installation of PUF disk: “Technical guideline: Methodology of Passive Air Sampling of Research Centre for Toxic Compounds in the Environment.”
  - Sample Analysis (at Vrije Universiteit Amsterdam & Örebro University)
-

# Cambodia



Passive Air  
Sampling  
Activities in  
Cambodia



## Cambodia

### Result of Analyzing POPs (PFOS, PFOA, PFHxs and PFOs precursors) from PUF Disk


		L-PFOS	Br-PFOS	Σ PFOS	PFOA	PFHxS	FOSA	NMeFOSA	NEtFOSA	NMeFOSE	NEtFOSE
KHM (2018-I)	pg/1 PUF	66	35	101	258	58	NR	NR	NR	NR	NR
KHM (2018-I+II+III+IV)	pg/4 PUF	227	90	317	1125	12	52.4	NR	<200	NR	NR
KHM (2018-II)	pg/1 PUF	57	31	88	354	65	<25	NR	NR	<200	NR
KHM (2018-III)	pg/1 PUF	47	13	60	158	96	<25	NR	NR	NR	NR
KHM (2018-IV)	pg/1 PUF	60	23	82	224	29	NR	NR	NR	NR	NR
KHM (2019-I)	pg/1 PUF	NR	NR	NR	0	NR	NR	NR	NR	<200	NR
KHM (2019-I+II)	pg/2 PUF	NR	NR	NR	0	NR	NR	NR	NR	NR	NR
KHM (2019-II)	pg/1 PUF	79	14	93	151	12	NR	NR	NR	<200	NR

Source: Örebro University

### Result of Analyzing POPs (PCB) from PUF disk (ng/{PUF)

PCB	KHM-1 (2018-I)	KHM-1 (2018-II)	KHM-1 (2018-III)	KHM-1 (2018-IV)	KHM-1 (2019-I)	KHM-1 (2019-II)	KHM-1 (2019-III)	KHM-1 (2019-IV)
28	0.45	0.37	0.38	0.39	<0.38	<0.38		
52	1.1	0.75	0.60	1.1	0.91	0.74		
101	2.4	1.7	0.62	2.6	2.0	1.1		
153	1.3	1.1	*0.67	1.4	1.3	1.6		
138	2.1	1.7	0.77	2.1	1.7	2.3		
180	*0.31	*0.35	*0.42	<0.29	*0.31	*0.29		




\*: Between limit of detection (LOD) and limit of quantification (LOQ)

 Not sampled or lost during shipment

Source: Vrije Universiteit Amsterdam

# Cambodia

## Result of Analyzing POPs (OCP) from PUF disk (ng/{PUF})

Toxaphene	KHM-9 (2018-I)	KHM-9 (2018-II)	KHM-9 (2018-III)	KHM-9 (2018-IV)	KHM-9 (2019-I)	KHM-9 (2019-II)	KHM-9 (2019-III)	KHM-9 (2019-IV)
CHB26	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16		
CHB50	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42		
CHB62	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50		

\*: Between limit of detection (LOD) and limit of quantification (LOQ)



Not sampled or lost during shipment

Source: *Vrije Universiteit Amsterdam*

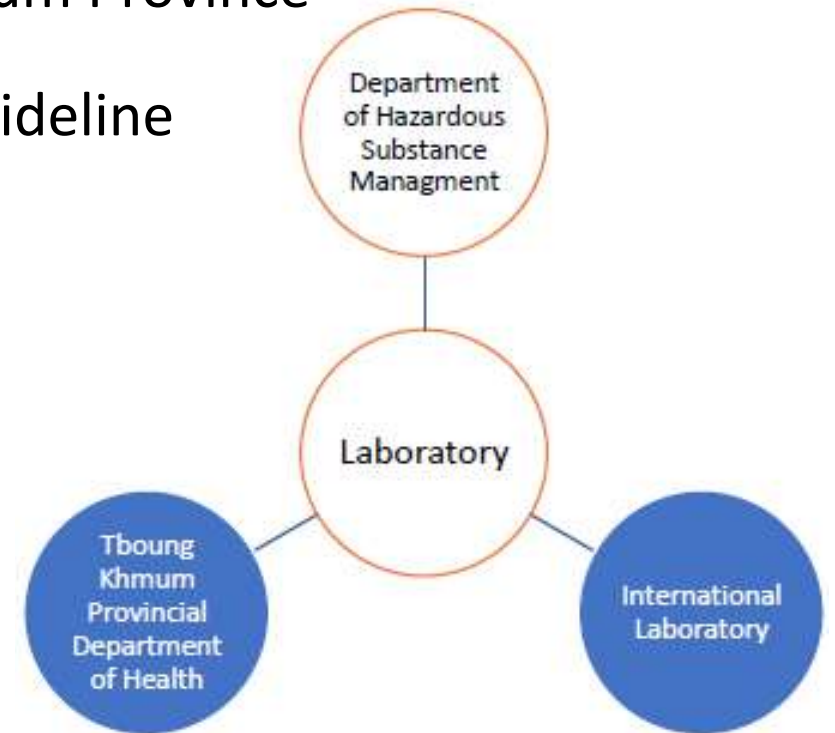
## [Result of Analyzing POPs \(Toxaphene\) from PUF disk \(ng/{PUF}\)](#)

## [Result of Analyzing POPs \(PBDE, decaBDE, PBB and HBCD\) \) from PUF disk \(ng/{PUF}\)](#)



### B. Human Milk POPs Survey

- Site Selection: 3 Referral Hospitals in Tboung Khmum Province
- Selection of Human Milk Donors: Based on the guideline
- Human Milk POPs Sampling: 50 Donors  
(only 44 qualified samples for PFHxS analysis )
- Sampling Schedule: May to June 2019
- Preservation of Collected Samples
- Analysis: (Individual vs Pool Sample)



# Cambodia

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## Human Milk Survey Activities



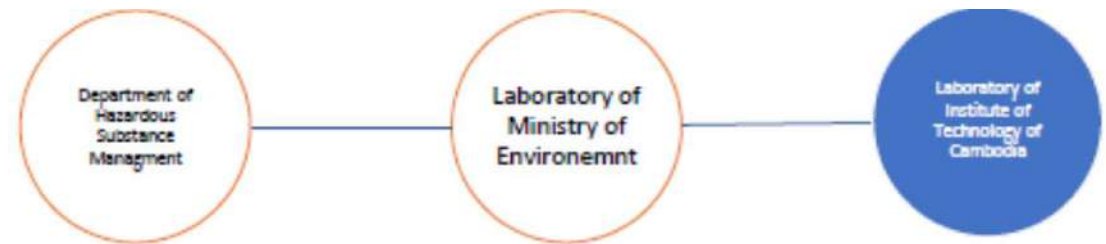
## Cambodia

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- *Results from analysis of PDBE in human milk*
  - *Results from analysis of PCDD/F, PCB in human milk*
  - *Results from analysis of Initial and New POPs in human milk*
  - *Results from analysis of Initial and New POPs in human milk (Hexa,Penta...)*
  - *Results from analysis of Initial and New POPs in human milk (Chlordecon...)*
-

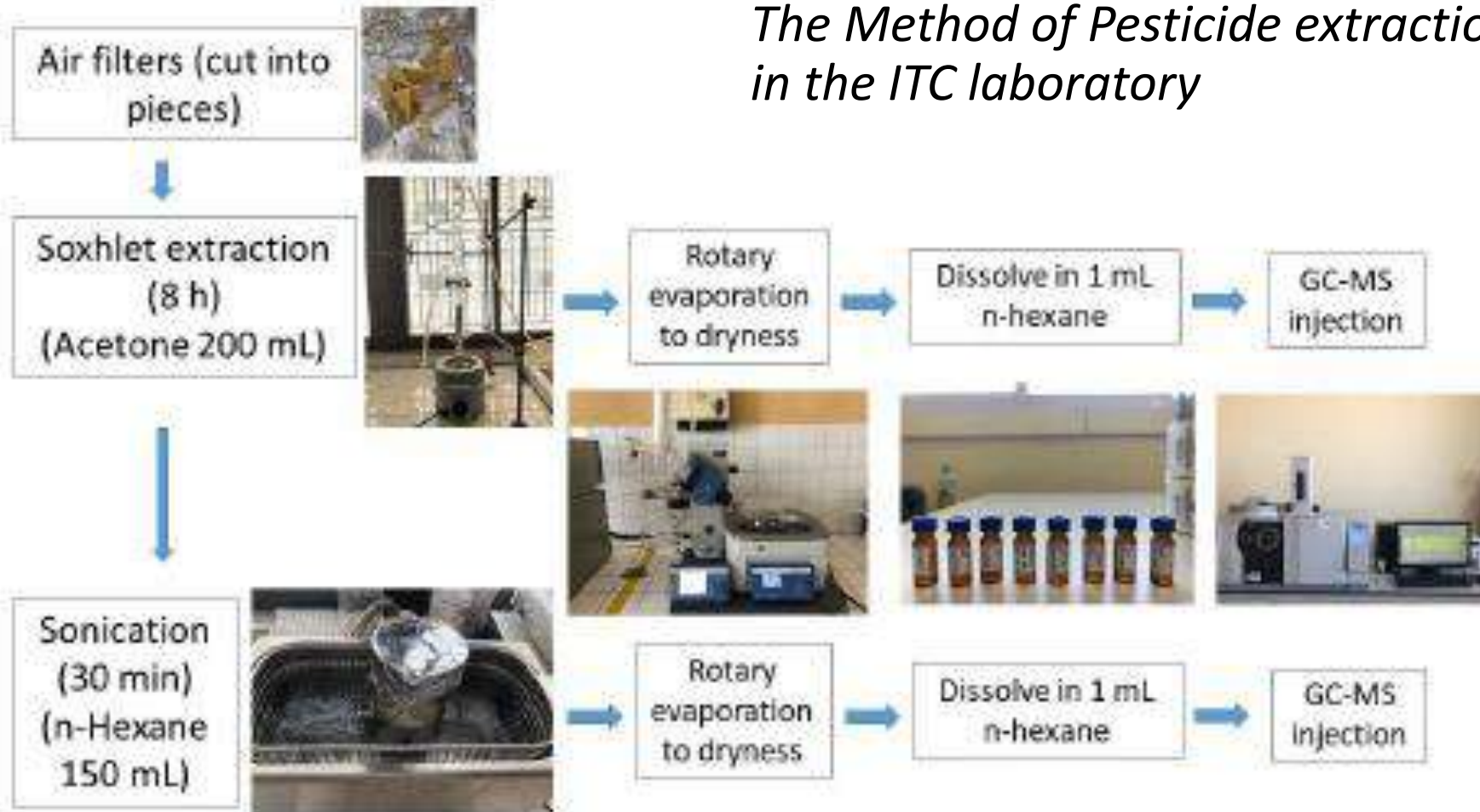
### C. National Laboratory Analysis

- The coordination scheme is setting up to facilitate the project implementation for this activity.
- Department of Hazardous Substances Management is in charge of admin, finance, cooperation and facilitating with stakeholders
- MOE's Lab cooperates with ITC's Lab to conduct the PUF disk analysis for air sampling.



## Cambodia

*The Method of Pesticide extraction implemented in the ITC laboratory*



## Cambodia

Result of selected POPs analysis  
from Cambodian Laboratory

Category	Compound names	Results (µg/mL)		LOD* (µg/mL)
		Soxhlet	Sonication	
Fungicides	Azaconazole	Not detected	Not detected	0.030
	Chloroneb	Not detected	Not detected	0.030
	Hexachlorobenzen	Not detected	Not detected	0.030
	Mefenoxam	Not detected	Not detected	0.070
	Metalaxyl	Not detected	Not detected	0.030
	Pyroquilon	Not detected	Not detected	0.090
	Triadimefon	Not detected	Not detected	0.030
Herbicides	Anilofos	Not detected	Not detected	0.150
	Atrazine	Not detected	Not detected	0.040
	Terbacil	Not detected	Not detected	0.040
Insecticides	Aldrin	Not detected	Not detected	0.030
	Chlordane	Not detected	Not detected	0.050
	Dieldrin	Not detected	Not detected	0.030
	Endrin	Not detected	Not detected	0.030
	HCHs	Not detected	Not detected	0.005
	Heptachlor	Not detected	Not detected	0.025
	Isazofos	Not detected	Not detected	0.085
	Isoxathion	Not detected	Not detected	0.020
	Malathion	Not detected	Not detected	0.095
	Methamidophos	Not detected	Not detected	0.450
	Methyl parathion	Not detected	Not detected	0.150
	O,p'-DDT	Not detected	Not detected	0.150
	Parathion	Not detected	Not detected	0.085

\* LOD: Limit of detection

### C. Capacity Building Activities

- Aim of the training
    - To build up capacity in the participating laboratory for the analysis of POPs (the organochlorinated pesticide and poly chlorinated biphenyls-PCBs)
    - To provides knowledge and practical related to sampling, handing, storage, extraction, cleanup of samples gas chromatography, reporting and various aspects of quality assurance and quality control (QA/QC) for the laboratory officers
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## Cambodia

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### C. Capacity Building Activities

- Training Schedule: 27-28 March 2019 (For Theory); 1-5, April 2019 (For Practice)
- Trainer: 2 trainers from the Virje Universteit (VU) Amsterdam, Netherlands





## Cambodia

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- Through the participation of this project, Cambodia has achieved many results as follows:
  - ✓ Fulfill the roles and responsibilities as a state member of the Convention
  - ✓ Gain knowledge and capacity in POPs sampling, analysis and monitoring
  - ✓ Expand cooperation with members of the convention
  - ✓ Enhance NIP updated via the use of the information from the project
  - ✓ Obtain the baseline data and information regarding the assessment of impact of POPs on the environment and public health of Cambodia

# “Key Challenges and Lesson Learnt”

- Cambodia is still in an early stage for POPs monitoring and Analysis with the lack of technical skills and laboratory analytical equipment for the POPs analysis.
  - The knowledge and experience from the training was constructive and productive; however, it would be even more practical if the training could have been extended to be a little bit longer aiming to provide more space for a larger participation from different stakeholders with more time for the exercises and practice.
  - The establishment of the joint research or program on POPs analysis and monitoring with state members should be promoted.
  - The support for the interpretation of the results should be considered.
-

# “For the Sustainability and future monitoring of POPs, we need to..”

- propose POPs capacity building training, analysis and monitoring action plans to the government to receive some fund to implement the assignment.
  - Seek the support (technical and financial resources) from international organizations.
  - Participate in the joint research and survey with national and international agencies
  - Build the capacity through joining the related training and workshops
-



# Thank you

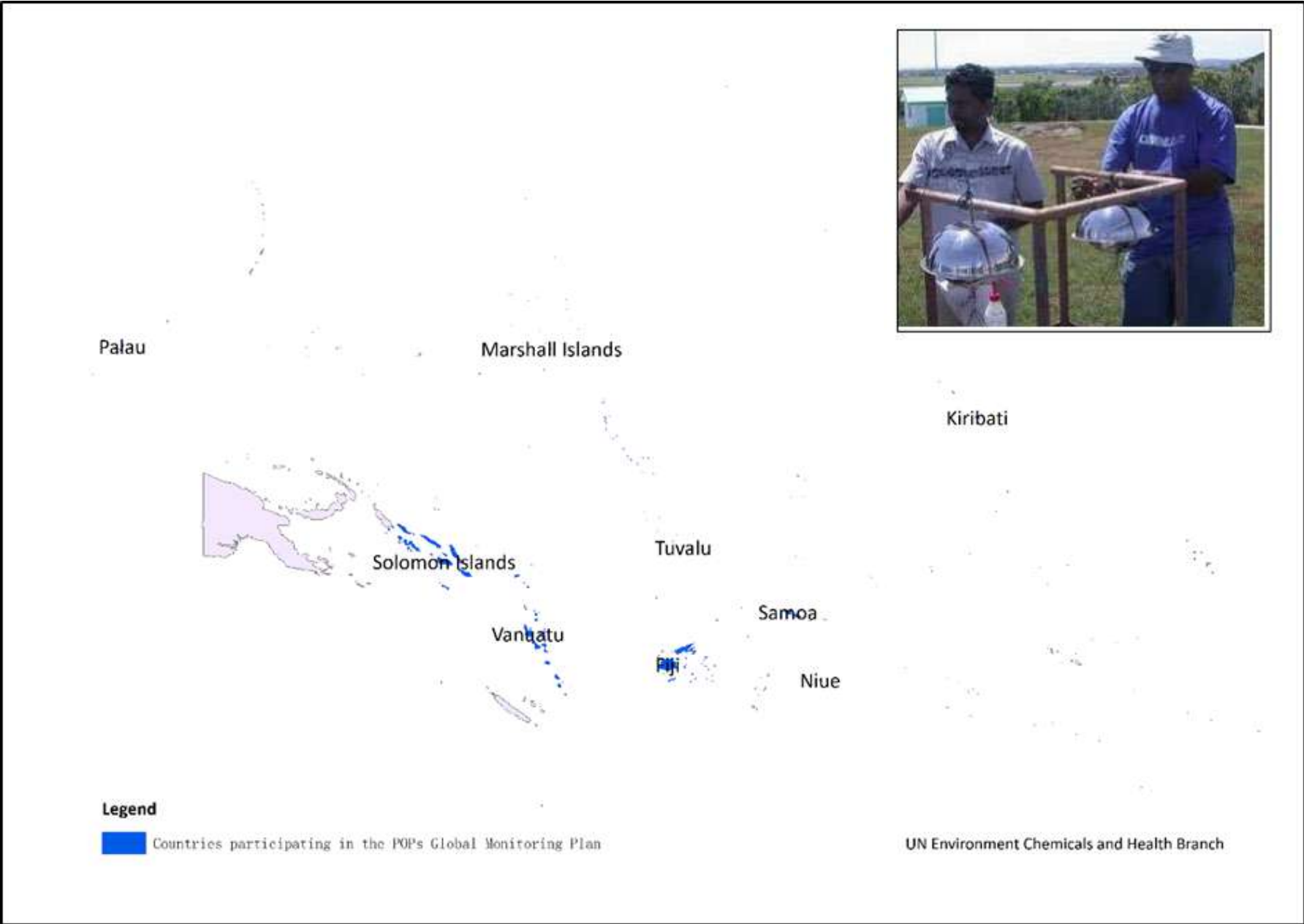
Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand 4-5 April 2023



# POPs GMP – Pacific Islands Final Workshop Outputs and Outcomes – GMP2

Dr Vincent Lal  
Mr. Philip Gabriel  
4 April, 2023  
Bangkok, Thailand



POPs GMP Final Workshop - Dr. Vincent Lal (Fiji)

# Outline

- Introduction
- Role of USP-IAS
- GMP2 Outcomes and outputs (Fiji)
- Lessons learnt
- Capacity building
- Sustainability plans
- Conclusions

## Introduction

- ❑ Regional university co-owned by 12 Pacific Island countries
- ❑ Combined population (excl PNG) is 2.3 million people, scattered across an area equivalent to 15 % of the globe's surface
- ❑ Fiji has an exclusive economic zone of 1,290,000 km<sup>2</sup>, however, only 1.5 % of which is land. The rest is the surrounding ocean
- ❑ Fiji is a signatory to the Stockholm Convention, but limited activities on POPs monitoring
- ❑ Knowledge gaps on status of POPs concentrations and trends



## Role of USP-IAS

- The Institute of Applied Sciences of the University of the South Pacific (USP-IAS) is the largest institute in the university
- It has a dedicated ISO17025 accredited laboratory but has limited analytical capacity to test for POPs
- It has a GC- $\mu$ ECD for basic POPs and a HPLC-MS/MS (PFAS)
- Assist in POPs monitoring in Fiji and other Pacific Islands
- Assist in passive air/water/human milk sampling activities
- Establish analytical capacity for trace contaminant analysis

## GMP2 Outcomes and outputs (Fiji)

- A total of 7 PUF samples were collected for OCPs from Fiji, sampling was at three month intervals from 2017 - 2019
- A total of 3 PUFs were sent for dl-POPs
- A total of 7 PUFs were sent for Br-POPs
- A total of 5 PUFs were collected for PFAS
- A total of 5 surface water (grab samples) were collected for PFAS between 2017 - 2018
- National human milk samples
- National samples (i.e. eggs, chicken, sediment, beef)

## Lessons learnt

- Project coordination
- Sampling activities
  - Air
  - Water
  - Human milk
  - National samples
- Analytical capacity building
- Other POPs monitoring activities (University of Queensland, QAEHS)

## Capacity building

- Training on sample chain-of custody (sample integrity)
- Training in operation and care of GC  $\mu$ -ECD, HPLC-MS/MS
- Training on OCPs and PFAS methodology, QAQC
- Familiarisation with POPs Interlaboratory proficiency testing
- Workshop on data analysis and reporting
- Peer mentoring for research design and academic publication

## Sustainability plans

- Establish financial system to sustain national networks to coordinate sampling and analysis of POPs (i.e. co-financing, co-investment, grant)
- Provide adequate training and maintain core staff
- Continue to develop analytical capacities through co-investment
- Support community awareness in order to ensure that all levels of society participate in sustainable monitoring of POPs
- National feedback mechanisms need to be developed to encourage information sharing between governments, non-governmental organisations as well as community-based organisations

## Sustainability plans

- ❑ Support the role of regional institutions to sustain POPs research
- ❑ National database on sampling sites, data on concentrations, trends
- ❑ Working with NGOs Programmes i.e. ambient air and water quality for protection of native and or vulnerable species (co-investment)
- ❑ It is important to build critical mass of support for POPs monitoring in Fiji (interventions to influence national environment, health policy)

## Conclusions

- GMP2 results from expert laboratories for core matrices from Fiji
- Further decline in concentrations of OCPs can be expected to continue although less gradually (air and human milk)
- Limited PCDD/PCDF and PFAS data to establish trends
- Synergies needed to promote research on POPs
- Need for greater awareness on POPs in the general public
- Access to sophisticated instruments, POPs technicians and experts
- Need to establish a dedicated laboratory unit for trace contaminants

# Acknowledgement

- UN Environment Programme for supporting the GMP activities in Fiji
- Prof. Heidelore from the Orebro University
- Prof. Jacob de Boer from Vrije University
- Prof Jochen Mueller from the University of Queensland
- Mothers donating human milk samples
- Communities in Fiji for access to their land for sampling
- IAS staff who assisted in sampling
- Late Prof. Bill Aalbersberg and Mr. Usaia Dolodolotawake



**Thank you**



# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

## Project country perspective INDONESIA

Anton Purnomo  
Basel and Stockholm Conventions  
Regional Centre

Ariyastuti  
Directorate of Hazardous Substances,  
Ministry of Environment and Forestry  
Indonesia

Final meeting of the UNEP/GEF POPs GMP  
projects in the Asia and the Pacific region

4-5 April 2023

UN ESCAP, Bangkok, Thailand



BASEL CONVENTION REGIONAL CENTRE FOR SOUTHEAST ASIA &  
STOCKHOLM CONVENTION REGIONAL CENTRE INDONESIA

# Project countries perspective

- Summary of activities under the project, including among others sampling, national analysis, capacity building, additional activities etc.
- Summary of main results and outputs
- Awareness raising and policy engagement
- Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building
- Usage of the data/outputs of the GMP project in your country, if any
- What will be needed for better use of the data
- Lessons learnt and experiences gained
- Consideration for sustainability and future monitoring of POPs

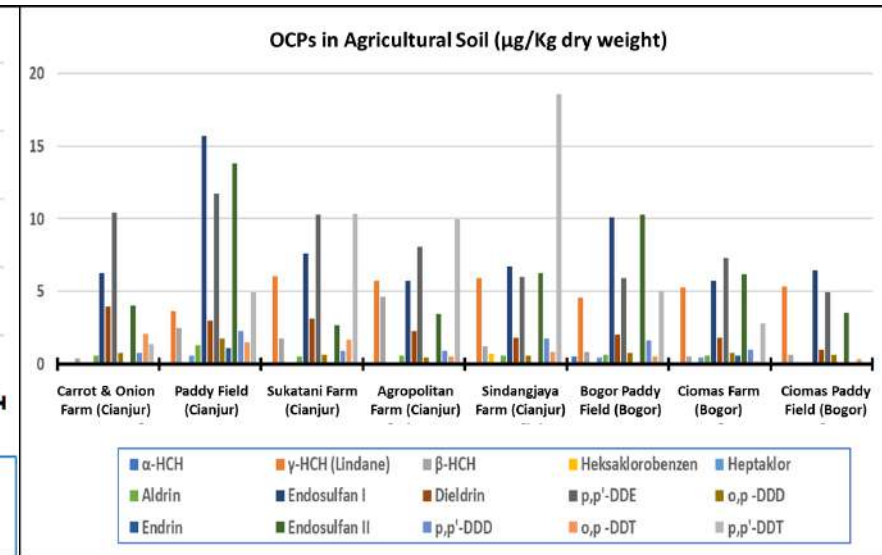
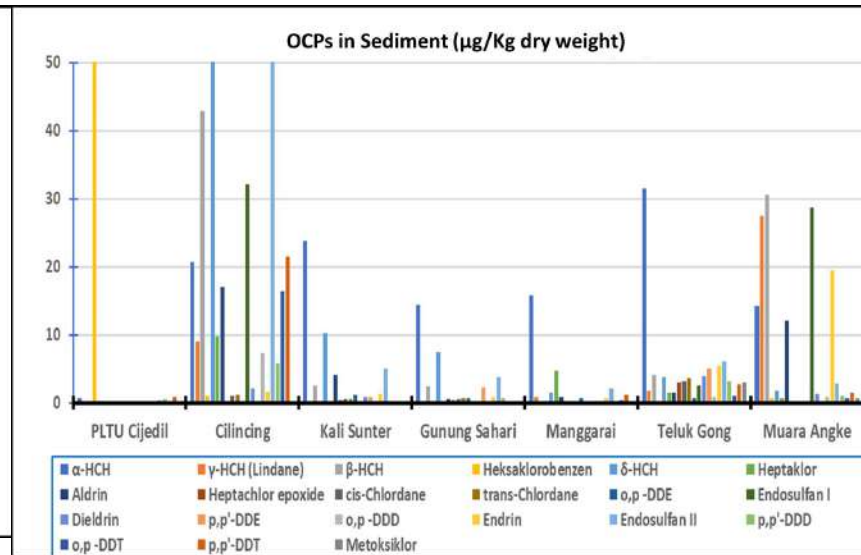
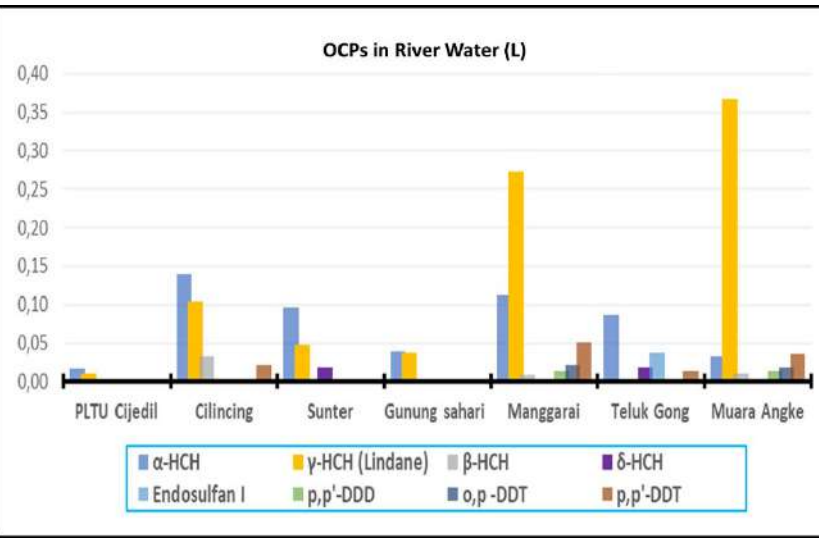
# Summary of activities under the project

1. Undertake air sampling;
2. Undertake sampling of matrices of major national interest;
3. Conduct activities to strengthen national and sub-regional analytical capacity;
4. Draft a national report presenting implementation and monitoring results and contribute to the development of a sustainable regional monitoring plan



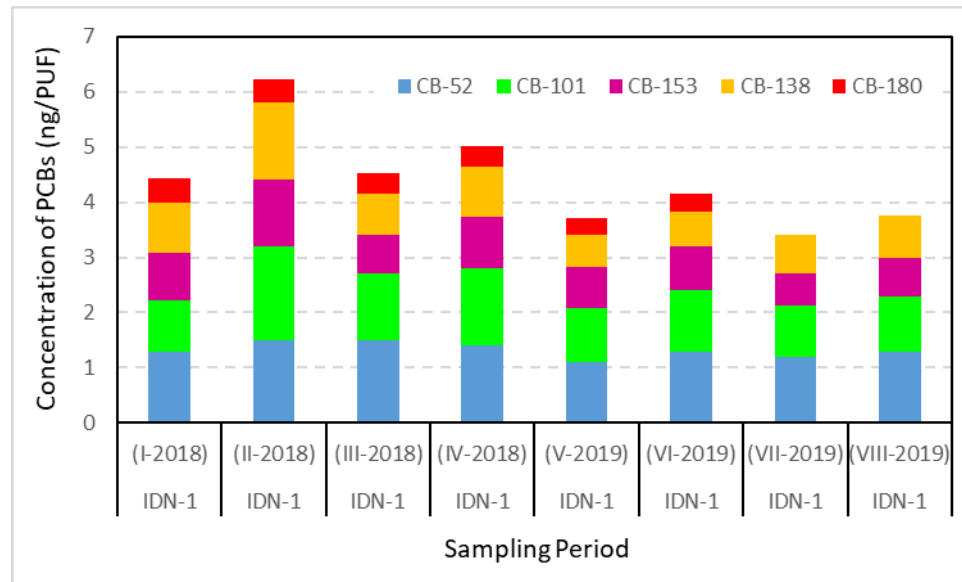
# Summary of main results and outputs

- Result Generated from National Laboratories

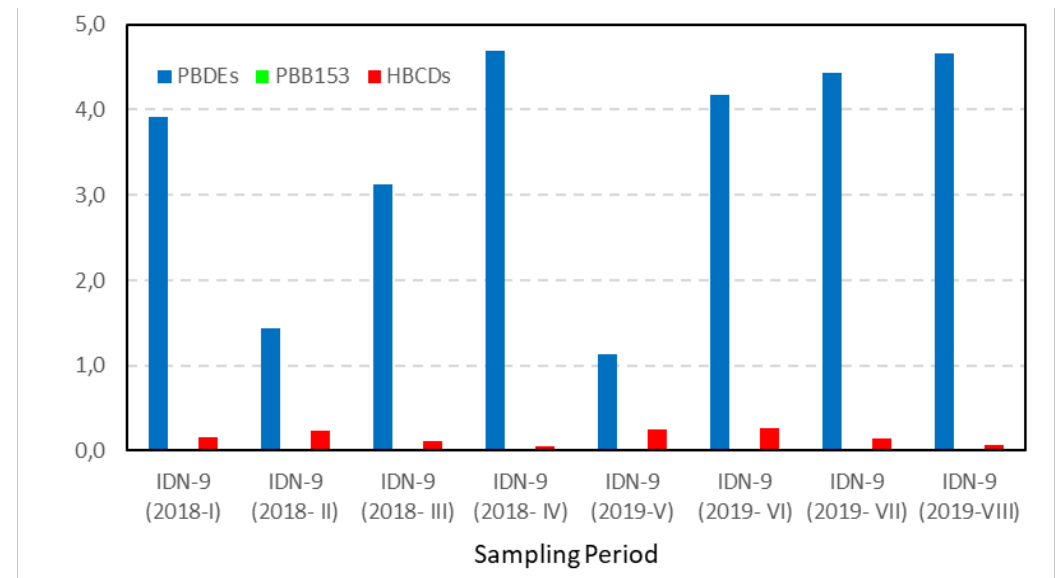


# Summary of main results and outputs

- Results from Expert Laboratories



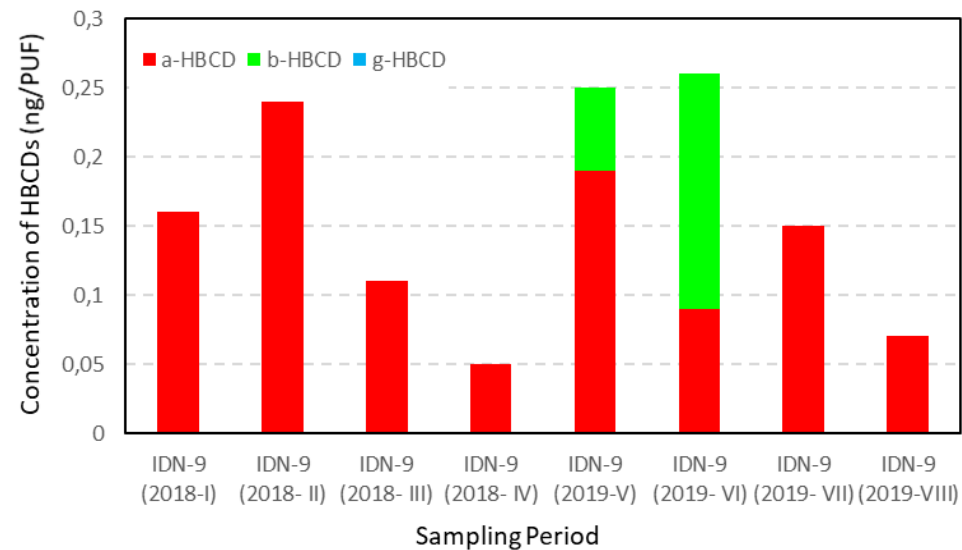
Concentration and Composition of PCBs in PUF-PAS from Jakarta within sampling period between 2018-2019



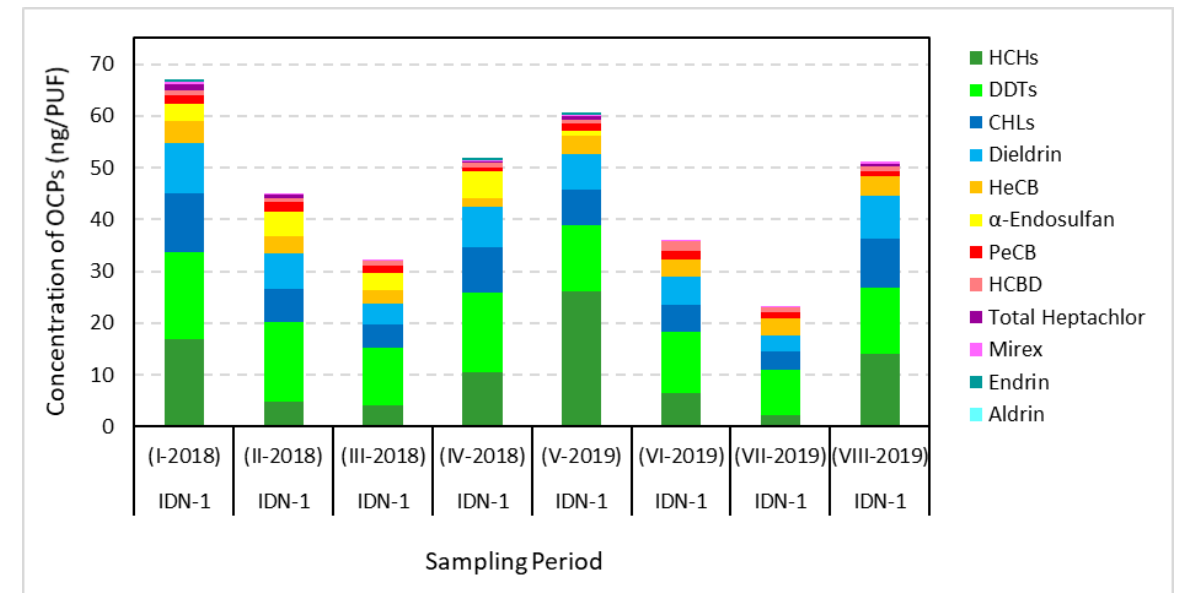
Concentration of BFRs in in ambient air of Jakarta within the period of 2018-2019

# Summary of main results and outputs

## • Results from Expert Laboratories



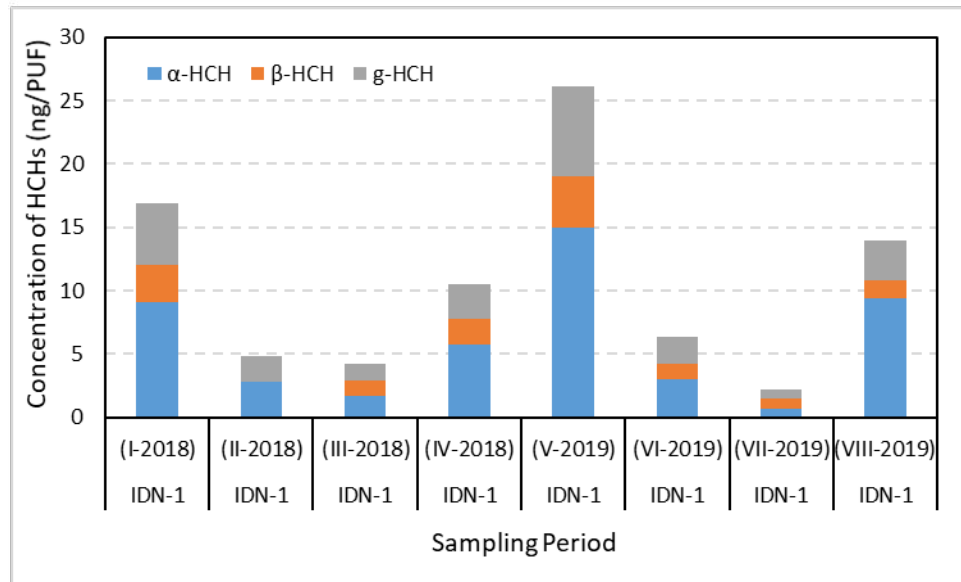
Concentration and composition of HBCDs in ambient air of Jakarta within the period of 2018-2019



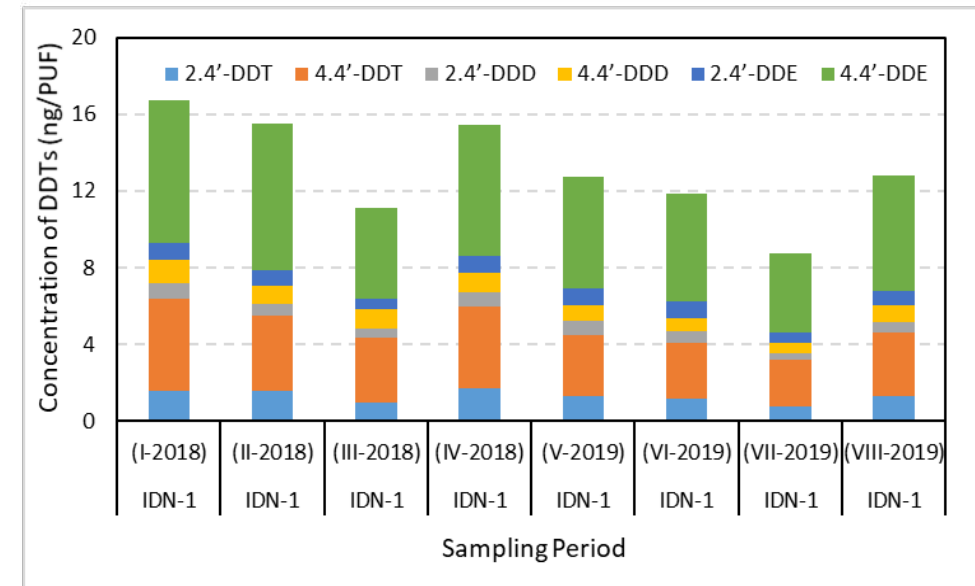
Concentration of organochlorine pesticides (OCPs) in ambient air of Jakarta within Sampling Period between 2018-2019

# Summary of main results and outputs

- Results from Expert Laboratories



Concentration and proportion of HCHs in ambient air of Jakarta during sampling period of 2018-2019

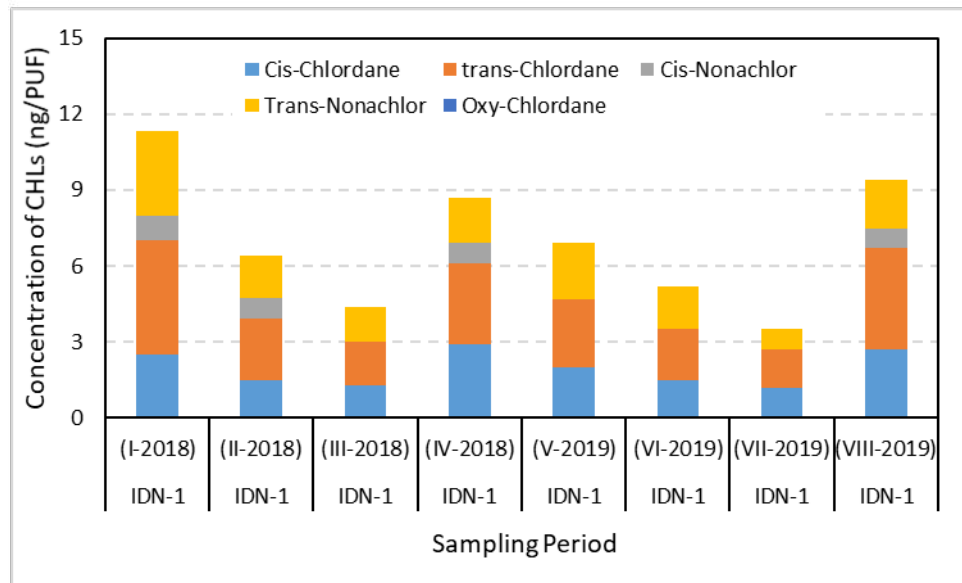


Concentration and proportion of DDTs in ambient air of Jakarta during sampling period of 2018-2019

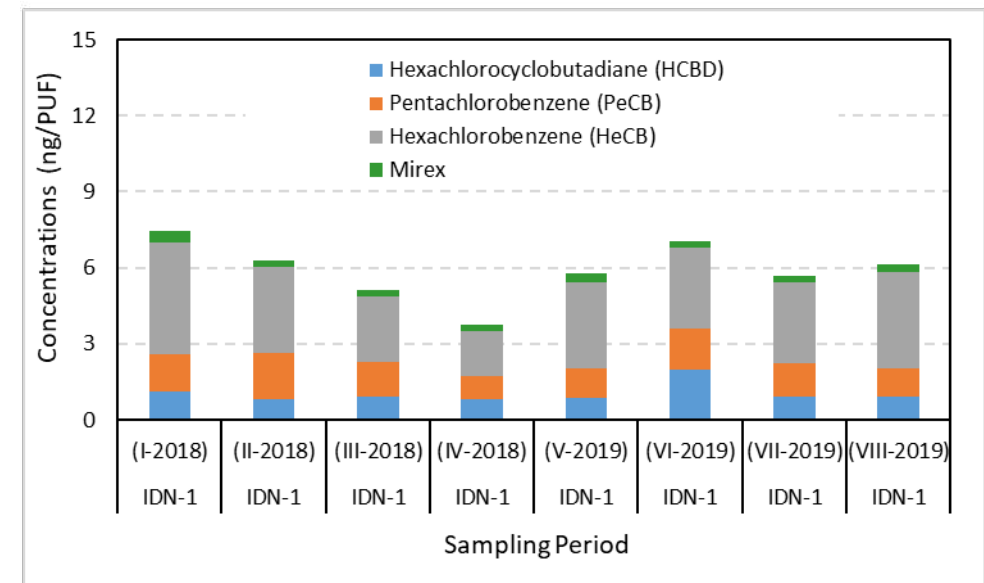


# Summary of main results and outputs

- Results from Expert Laboratories



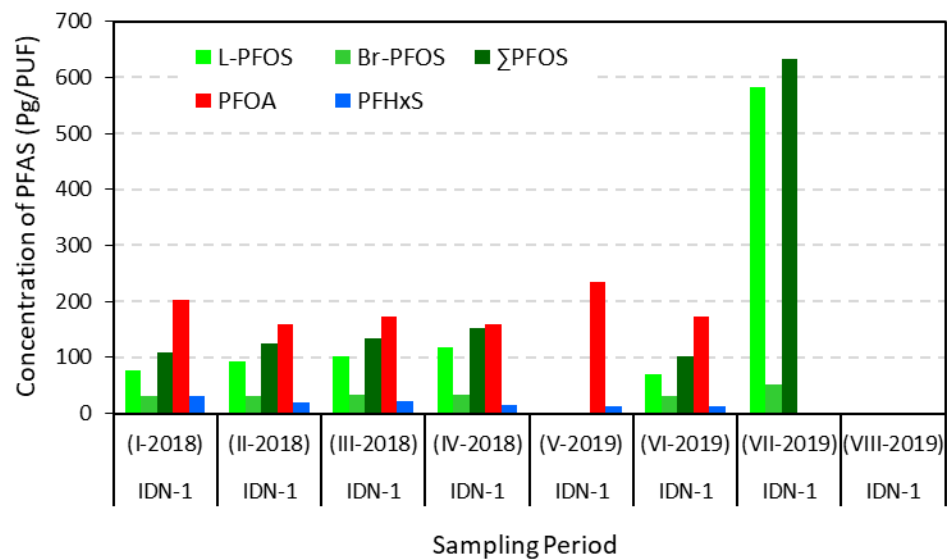
Concentration and proportion of CHLs in ambient air of Jakarta during sampling period of 2018-2019



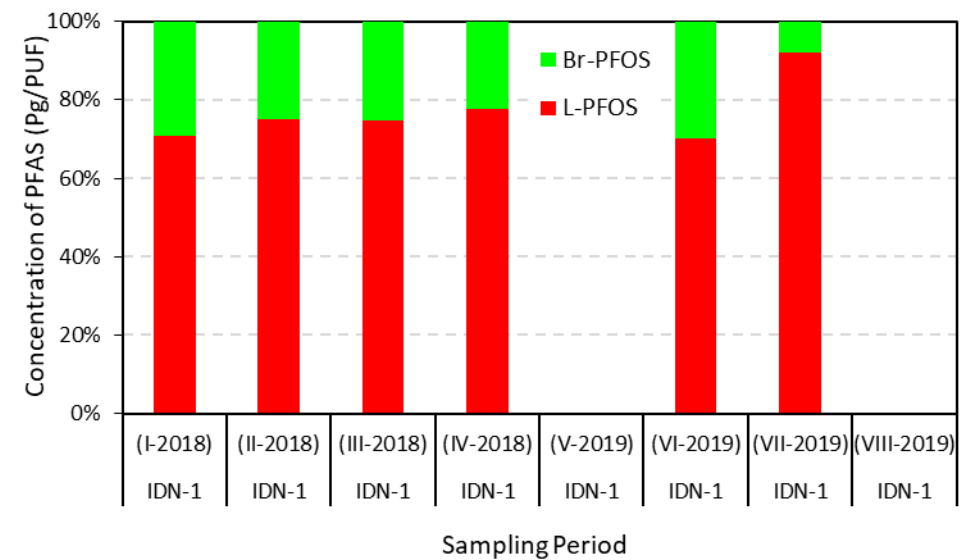
Concentration HCB, PeCB, HCB and Mirex in ambient air of Jakarta during sampling period of 2018-2019

# Summary of main results and outputs

- Results from Expert Laboratories



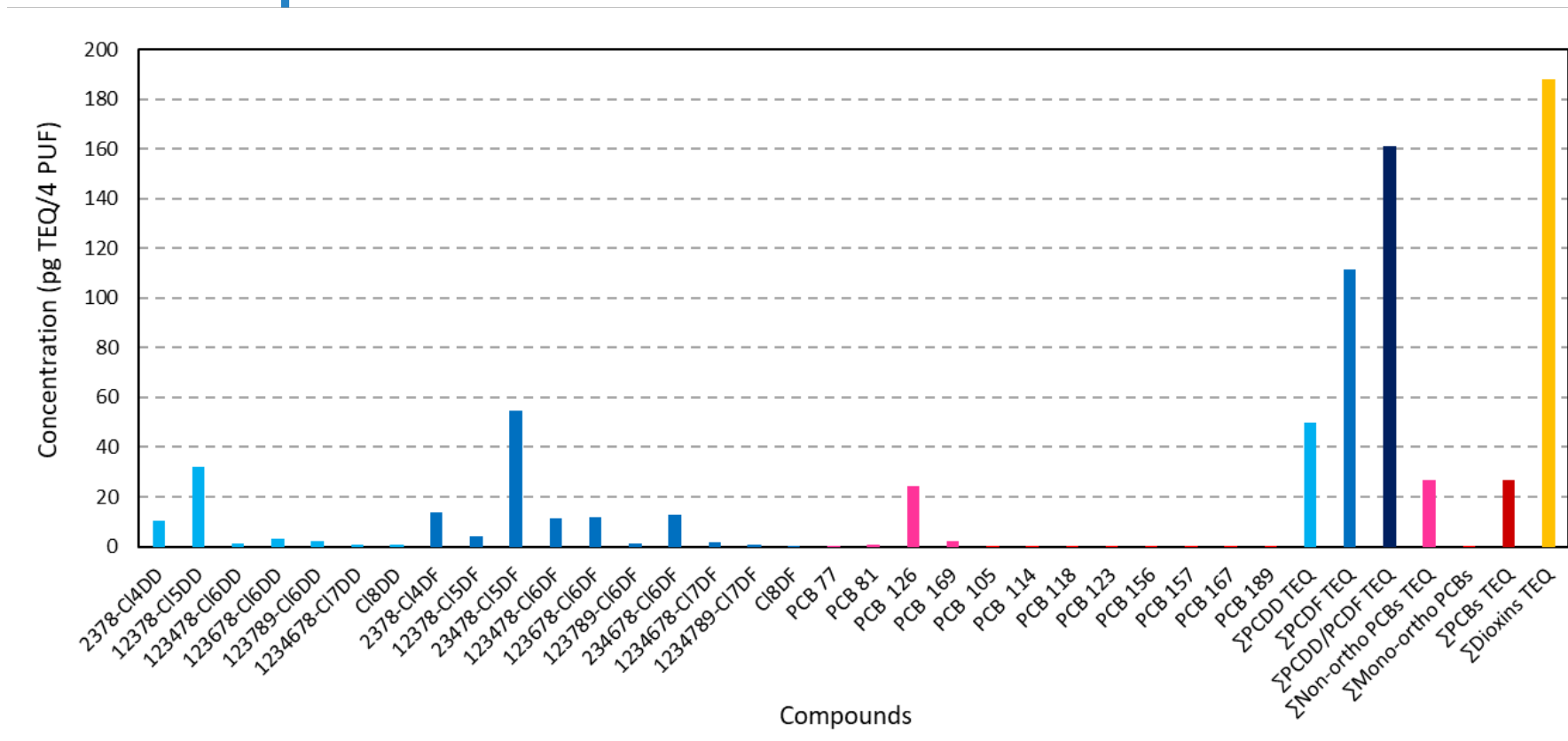
Concentration of PFAS in ambient air of Jakarta during sampling period of 2018-2019



Composition of PFOS isomer in ambient air of Jakarta during sampling period of 2018-2019

# Summary of main results and outputs

- Results from Expert Laboratories



TEQ Concentration of dioxins in ambient air of Jakarta during 2018

# Awareness raising and policy engagement

- Capacity building workshop at Environmental Management Center (EMC)
- MOEF submitted the NIP POPs review and update on 2021 addressing COP 9 amendment
- Ministerial Regulation no 29 year 2020 on PCB Management
- MOEF is in process on revising the Government Regulation no 74 year 2001 on the Hazardous Substances Management



Review and Update of National Implementation Plan (NIP)  
for the Stockholm Convention on Persistent Organic  
Pollutants (POPs)

REPUBLIC OF INDONESIA  
2021



Ref. No. 532/JADM/2021

The Permanent Mission of the Republic of Indonesia to the United Nations, WTO and other International Organizations in Geneva presents its compliments to the Secretariat of the Stockholm Convention on Persistent Organic Pollutants and has the honour to transmit herewith the Government of Indonesia's National Implementation Plan to the Stockholm Convention, pursuant to Article 7 of the Convention.

The Permanent Mission of the Republic of Indonesia to the United Nations, WTO and other International Organizations in Geneva avails itself of this opportunity to renew to the Secretariat of Stockholm Convention on Persistent Organic Pollutants the assurances of its highest consideration.

Geneva, 18 November 2021



Secretariat of the Stockholm Convention on Persistent Organic Pollutants  
11-13, Chemin des Anémones - 1219 Châtelaine  
srs@un.org, contacts@brsmeas.org



## Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building

- Capacity building workshop at Environmental Management Center (EMC)
- Collaboration with PT PLN Laboratory and BRIN Laboratory to monitor the PCB and its disposal with PT PPLI (UNIDO project)
- PBDE project with UNDP in collaboration with Ministry of Industry

# Usage of the data/outputs of the GMP project

The data/output of the GMP project was used to support the development of the NIP POPs review and update Indonesia

# What will be needed for better use of the data

- To be shared during the upcoming COP Stockholm Convention as baseline data

# Lessons learnt and experiences gained

- Improve national awareness during the project
- The project also support national level on the NIP POP review update development
- Increase national capacity building through laboratory training
- National laboratories need to upgrade the equipment's, to be able to analyze new POPs chemicals
- Need to improve collaboration with cross-ministries (especially customs as the boarder inspector)



# Consideration for sustainability and future monitoring of POPs

- To increase the POPs issue into National Priority Program
- To collaborate with academe and specific national or international journal
- To collaborate with specific industries



# Thank you

For more information please contact:

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Regional Centre  
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[secretariat@rc-sea.org](mailto:secretariat@rc-sea.org)

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Environment and Forestry  
Email: [ariyastuti297@gmail.com](mailto:ariyastuti297@gmail.com)





# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

Marshall Islands

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific  
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Bangkok, Thailand 4-5 April 2023



# Marshall Islands



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- Summary of activities under the project:
    - Air Sampling(Arno atoll)
      - Site was identified, passive air samplers were installed and PUFs were replaced every three months. The PUFs were sent to designated laboratories for analysis.
    - Marine water sampling(Majuro Atoll)
      - Site was identified, water collection was done every three months and sent to designated laboratories for analysis.
    - Human milk survey sampling(Ebeye, Kwajalein Atoll)
      - Human milk were surveyed and collected
      - Samples were sent to designated laboratories for analysis
  
    - Matrices of major National interest.
      - Activity was not done
  
    - National report
      - No National report was done
  
  - Summary of main results and outputs
    - No results were received from designated labs.
  
  - Awareness raising and policy engagement
    - Awareness raising was done in Ebeye and Arno atolls.
  
  - Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building
    - Office of Environment Policy Planning Coordination/Climate Change Directorate(CCD).
-

## Marshall Islands

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- Usage of the data/outputs of the GMP project in your country, if any
    - No data was made available.
  - What will be needed for better use of the data
    - Availability of data and capacity building in order to provide good decision making.
  - Lessons learnt and experiences gained.
    - Inconsistency in reporting and making reports available.
    - Logistics of constraints
    - Experiences gained, improving understanding on POPs and its effects on Environment and Human life.
  - Consideration for sustainability and future monitoring of POPs
    - Financial Aid to continue monitoring of POPs activities in the future.
    - Better communication with lead implementation agency.
-



Thank you  
Kommol tata!

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

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# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

Project country perspective: Mongolia

Enkhtuul Surenjav, Mongolian Academy of Sciences

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand 4-5 April 2023



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- Summary of activities of POPs Monitoring project in Mongolia, 2017-2021
  - Summary of main results and outputs
  - Other activities/publications
  - Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building
  - Consideration for sustainability and future monitoring of POPs
-



## Project Implementation (GEF ID 4894, UNEP Code 4F32)

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### The levels of POPs in following media:

- ✧ Environmental media
  - ✧ air (PUF and AAS)
  - ✧ water
  - ✧ soil
- ✧ Sampling of matrices of national interest including some food samples
- ✧ Pooled human milk sample
  
- 🔍 Project implementation and all sampling were undertaken by the Institute of Chemistry and Chemical Technology, Ulaanbaatar
- 🔍 The analysis was performed in the expert laboratories;
  - 🔍 MTM Research Centre, Örebro University, School of Science and Technology, Sweden- **Dioxin-like POPs and PFAS**
  - 🔍 CVUA Laboratory, Freiburg, Germany- **Human milk, chlorinated and brominated POPs**
  - 🔍 Environment and Health Department, Vrije University of Netherlands- **POPs pesticides, PCB and brominated flame retardants**

## Project Implementation: Environmental samples

### Passive air samplers (PAS)

- ✍ Sampling site was identified at the coordinates of 47°55'06-N, 106°58'15-E in Bayanzurkh district of Ulaanbaatar city
- ✍ PAS equipped with polyurethane foam (PUF) disks installed in protective chamber
- ✍ PAS with pre-treated PUFs are co-exposed for 3 months to allow for effective take-up of the different groups of POPs.

### Active air sampling

- ✍ An active air sampler was installed, and two samples collected during three consecutive days (Sep 2019 and Dec 2019)

### Water sampling

- 📖 The sampling site was a fresh water site located at the Tuul river in Ulaanbaatar at 47° 53' 21" N and 106° 54' 37" E
- 📖 Water samples were collected in 1-L high-density polyethylene (HDPE) bottles
- 📖 Sampling occurred 4-times per year towards the end of each quarter.

### Soil samples

- ✓ Bulgan province, MNG-SL1 & MNG-SL2 at the coordinates of N 48° 48' 59" and E 103° 31' 42"
- ✓ Selenge province, MNG-SL3 at the coordinates of N 48° 48' 51" and E 106° 5' 40"
- ✓ Khentii province, MNG-SL4 at the coordinates of N 49° 00' 37" and E 111° 33' 00"



## Project Implementation: Human milk sampling & National samples

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### Human milk sampling survey

- The survey was conducted following a protocol originally developed by WHO and modified by UNEP to allow analysis for all POPs
- One national pool as a representative sample was prepared by collecting 50 mL of breast milk from 50 mothers
- The most important criterion is that the donating mother should be *primiparae*; all other criteria were less important and included that the donor should be (i) healthy, (ii) exclusively breastfeeding one child (no twins), and (iii) residing in the area since about five years.
- The recommended time for taking the sample was 3-8 weeks after delivery.

### National samples/Food samples

- ☒ Meat samples: beef, fish, mutton, horse meat, pork, chicken,
- ☒ Dairy products: cow milk, mare's milk, butter
- ☒ Others: sheep's tail fat oil, chicken egg, sea buckthorn, sea buckthorn oil, flaxseed, soil

## Result highlights of GMP2 project

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- A total of 51 samples were analyzed for POPs whereby 23 POPs were detected frequently;
- Endrin and hexabromobiphenyl (PBB 153) were not quantified in any of the samples; toxaphene was found only twice in air samples; and dicofol, pentachlorophenol, and short-chain CP were analyzed only in one human milk sample;
- The highest detection frequency was for PFOA (32 of 43 samples) and PFOS (31 of 43 samples);
- Dioxin-like polychlorinated biphenyls (dl-PCB) were detected in 100% of the samples analyzed (N=28).
- The highest amounts were found in soil samples,
  - 30 µg/kg for lindane,
  - 13 µg/kg for α-HCH,
  - 10 µg/kg for DDT and its transformation products;
- Concentrations of dl-POPs were low in general as were the PFAS;
- With respect to brominated flame retardants, the presence of HBCD in air samples was surprising (28.1 ng/PUF).
- At present, the analytical capacity to analyze POPs in various matrices under the global monitoring plan for POPs is being set-up to strengthen future environmental monitoring activities

## Publications with monitoring results: 3 research articles & 3 conference speech

**"POPs monitoring in Mongolia-Core matrices",**  
Chemosphere, 297, 134180 (2022)



**Chemosphere**



**Conference ppts**



Organohalogen Compounds Database  
Search

**"Stockholm Convention POPs in abiotic and biota samples from Mongolia"** Organohalogen compounds, 83 (2022), p.380-384

1. 42<sup>nd</sup> International Symposium on Halogenated Persistent Organic Pollutants-Dioxin 2022, Oct.9-14, 2022, New Orleans, USA
2. The 5<sup>th</sup> International Conference on Chemical Investigation and Utilization of Natural Resources, Ulaanbaatar, Oct 2021
3. Chemistry-2022, The 1st National Conference, Ulaanbaatar, Nov 2022

**"Food safety: The contamination of Persistent Organic Pollutants in some food products"** BICCT, №10, p. 131-139 (2022)



## Capacity building activities at national POPs laboratory

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### Training:

UNEP Chemicals' POPs training on PCB/OCP analysis on GC was organized (Prof. Jacob de Boer and Mr. Jacco Koekkoek) Feb 06-14, 2017

Training on high volume air sampler (Dr. Esteban Abad); Sep 16-21, 2019 (8 samples were collected dl-POPs, PBDEs, basic POPs, and PFOS compounds)

### Analytical methods/sample preparation:

Selecting analytical methods for POPs analysis by GC-MS/MS  
Translate and approve national standards  
National Laboratory analysis (Soil samples only)



### Analytical instruments:

GC ECD 7890A from Agilent  
Thermo Scientific TSQ 8000 (Triple Quadrupole GC-MS/MS)

### Other lab facilities:

Air sampling equipment both for active and passive sampling  
Sample preparation room  
Chemicals, standard solutions etc.



## Other activities

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### Organized Midterm Workshop of the POPs Global Monitoring Plan in the Asia Region, Aug 2018



- Report addressing national capacity needs for the sustainable monitoring of POPs in Mongolia
- Video on POPs issue and activities in the country

### Participated in the 4th round POPs Interlaboratory assessment

Test solution of analytical standards: OCP, PCB, PCDD/F, dl-PCB,  
Test samples: Sediment, Human milk, Air extract (toluene)

### Sampling of plastic pellets from recycling for new products

Survey completed  
Sample collection is ongoing

## Collaboration and synergies with other national/regional initiatives

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### **1. Part of the POPsEA Project since 2004**

- Cooperative air monitoring in Terelj area were done in 2006, 2007 and 2013 (individual sampling planned in summer 2023)
- Regular participation for Workshop on Environmental Monitoring of Persistent Organic Pollutants (POPs) in East Asian Countries.
- ICCT POPs laboratory expressed the willingness to join the Core laboratories programme
- Organized Technical Seminar on Persistent Organic Pollutants Monitoring & Training of POPs sampling, Sep2022 (Dr. Takuya Shiozaki)

### **2. Collaboration with National Institute of Environmental Research, Ministry of Environment, Republic of Korea**

Regular Participation for Analysis Training of Persistent Organic Pollutants (POPs) for East Asian Countries



## Consideration for sustainability and future monitoring of POPs

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- ✓ Strengthening the national POPs laboratory capacity and skill of lab staff  
(further trainings are needed)
  - ✓ Matrices to analyze - food samples, human breast milk, air and soil samples  
(need support for analytical methods)
  - ✓ Monitoring plan for priority POPs - legacy POPs including lindane, HCH, DDT, indicator PCB, and PFOA and PFOS
  - ✓ Continue the Air monitoring under POPsEA project
  - ✓ Continuing the GMP project is recommended, as the monitoring data it provides is essential for developing future policies related to POPs in the Mongolian environment
-



БАЙГАЛЬ ОРЧИН  
АЯЛАЛ ЖУУЛЧЛАЛЫН ЯАМ

# Thank you

Project team at the ICCT, MAS:  
Laboratory of Food Chemistry  
Laboratory of Ecological Chemistry  
Laboratory of Instrumental Analysis

& Experts:

Dr. Heidelore Fiedler, Orebro University, Sweden

Prof. Jacob de Boer, Vrije University, Netherlands

Dr. Rainer Malisch, CVUA Laboratory, Freiburg, Germany

Dr. Esteban Abad, Spanish Council for Scientific Research in Barcelona, Spain

Bangkok, Thailand 4-5 April 2023

Overview of the outputs and outcomes of the  
UNEP/GEF POPs GMP project

# Palau Perspective

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Final meeting of the UNEP/GEF POPs GMP projects  
in the Asia and the Pacific Region

BANGKOK, THAILAND 4-5 APRIL 2023

The Palau Environmental Quality Protection Board (EQPB) coordinated the efforts for this round of sampling for the Republic of Palau.

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EQPB collected water samples for the project.

The Environment Inc. (TEI), contractor, collected human milk samples in conjunction with the Ministry of Health and air samples in conjunction with EQPB.

# Palau Sampling

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Samples were sent to Örebro University, School of Science and Technology, MTM Research Center for analysis.

Pesticides were found, although at very low levels, including HCHs, dieldrin, endrin, chlordanes, as well as DDTs.

The most important industrial chemicals were PCBs, along with small amount of PBDEs. PFOS and related chemicals were not detected, whereas dioxins and furans were found in significant amount.

Amongst the POPs detected dioxins, furans and alpha-endosulfan were the most prevailing ones. Over the time, levels of POPs tended to decrease, although the period over which the monitoring was conducted was too short to provide conclusive trend.

# Capacity Building Activities

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Prior to the initial sampling for the water samples, training was conducted by the National Monitoring Coordinator, using the provided protocols from the MTM Research Centre, Örebro University.

Additionally, the contractor, The Environment Inc. (TEI), worked with Palau Community College to collect and ship off the air PUFs for the duration of the project.

# Sustainability plan

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While there is interest in continuing data collection in Palau, the current capacity for monitoring and analysis is nonexistent without external technical and financial support.

Palau continues to be interested in sampling from biological matrices, which unfortunately was not collected for the GMP II due to Covid-19 related delay issues.

# Results

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## POPs levels in air

Analysis of core media revealed presence of various POPs in Palau. This provides evidence of environmental contamination contributing to the build-up of POPs in the environment.



# Results (continued)

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## POPs in Water

The results of POPs studies on PFOS and salts in water from background sites have revealed very low to undetectable levels of PFOS.

# Results (continued)

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## POPs in mothers' milk

Quantifiable levels of PFOSs and PFOA were detected in mothers' milk submitted samples UNEP/GEF project, with levels above the Limit of Quantification.

# Conclusion and recommendations

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Palau neither manufactures nor exports chemicals but are importers. POP contamination in environmental media is present but not fully inventoried. The following issues need to be addressed: awareness raising, access to data, analytical capacity building and strengthening.

# Recommendations on data coverage and gaps

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Air data coverage: Representative ambient air monitoring sites have been identified to support collection of comparable POPs data through UNEP/GEF.

Mothers milk data: The first survey of mothers' milk sampling received considerable support that provided samples for analysis of POPs. There is need to continue breastmilk survey in order to establish temporal trends in POPs levels.

# Coverage for other media:

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Data for other media should include other key matrices included sediments, fish, and food products. Due to limited personnel and time as a result of COVID-19 impacts, the intended national samples were not collected for analysis this round. Future efforts to provide data for other media should include detailed protocols and repeat of similar matrices.

# Lessons Learnt

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Palau, a developing nation, neither being a manufacturer or exporter is impacted by the presence of POPs, of which we have no capacity at this time to accurately determine the environmental and health risks it poses.

A suggestion to move forward is to develop a path to assist small countries that are affected by POPs build their capacity to incorporate testing and analysis at the most basic form in their own laboratories.

# Kom Kmal Mesulang - Thank you

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Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific Region

Bangkok, Thailand 4-5 April 2023

Overview of the  
outputs and  
outcomes of the  
UNEP/GEF POPs  
GMP project



PHILIPPINES



# Introduction

- The Philippines became a party to the **Stockholm Convention** on 27 February 2004 and entered into force on 27 May 2004.
  - Prior being a Party to the Convention, the Philippines have established a chemical management program for industrial chemicals through Republic Act (RA) 6969 “Toxic Chemicals and Hazardous and Nuclear Wastes Act of 1990”.
- The **Environmental Management Bureau (EMB)** under the Department of Environment and Natural Resources (DENR) is the implementing agency of RA 6969. Further, the EMB is also the focal agency in the implementation of the Philippine obligation on the Stockholm Convention.

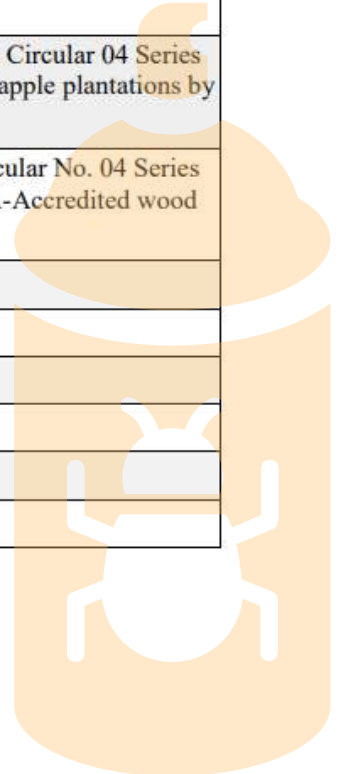
# Status of P O P s

- Though POPs policies of the country for industrial chemicals is mainly focused on PCBs (except for wastes which generally covers all POPs), our National Implementation Plan (NIP) for POPs indicates development of policies for the other POPs.

# Status of POPs pesticides

- On POPs pesticides, the Fertilizer and Pesticide Authority (FPA) under the Department of Agriculture (DA) is the agency directly mandated to monitor the management of POPs pesticides, through Presidential Decree (PD) 1144.

PESTICIDE	STATUS
DDT	Monitoring. Already banned since 2005
Endosulfan	Monitoring. Already banned since 2015
Lindane	Monitoring. Severely restricted pursuant to FPA Circular 04 Series of 1989. The only allowed use to date is on pineapple plantations by soil pre-plant application.
Pentachlorophenol and its salts and esters (PCP)	Monitoring. Severely Restricted as per FPA Circular No. 04 Series of 1989. For use in wood treatment only by FPA-Accredited wood treatments plants and institutions.
Aldrin	Banned since 1989
Chlordane	Banned Since 1999
Dieldrin	Banned since 1989
Endrin	Banned since 1989
Heptachlor	Banned since 1989
Toxaphene	Banned since 1989



The Philippines is one of the eight countries engaged in the Global Monitoring Plan (GMP) Project 2. The project is composed of five (5) components and as per discussion with the project's implementing agency, the Philippines planned be conducting the analysis of core abiotic matrix, human milk, fish and sediments sampling.

Securing conditions  
for successful project  
implementation

Component 1

Capacity building  
and analysis of core  
abiotic matrix (air)

Component 2

Capacity building and data  
generation on analysis of  
core biotic matrices  
(human milk)

Component 3

Assessment of existing  
analytical capacities and  
reinforcement of National  
POP's monitoring

Component 4

Securing conditions  
for sustainable POP's  
monitoring

Component 5



The Philippines was originally to do air, human milk, fish and sediments sampling and analysis however, due to some unforeseen circumstances and constraints, only air sampling and analysis was implemented.

Securing conditions for successful project implementation

Component 1

Capacity building and analysis of core abiotic matrix (air)

Component 2

Capacity building and data generation for analysis of core abiotic matrix (human milk)

Component 3

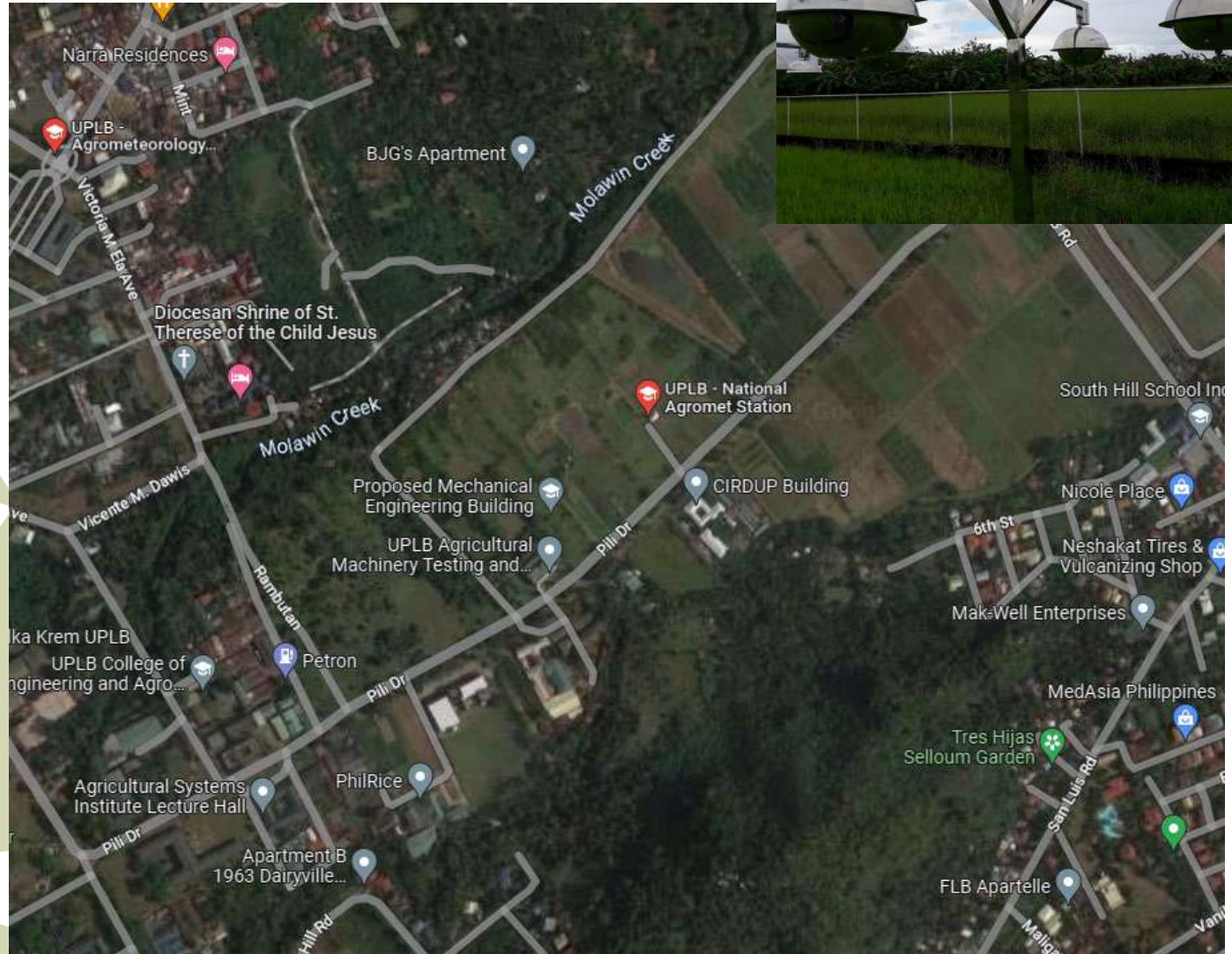
Assessment of existing analytical capacity and reinforcement of national POP monitoring

Component 4

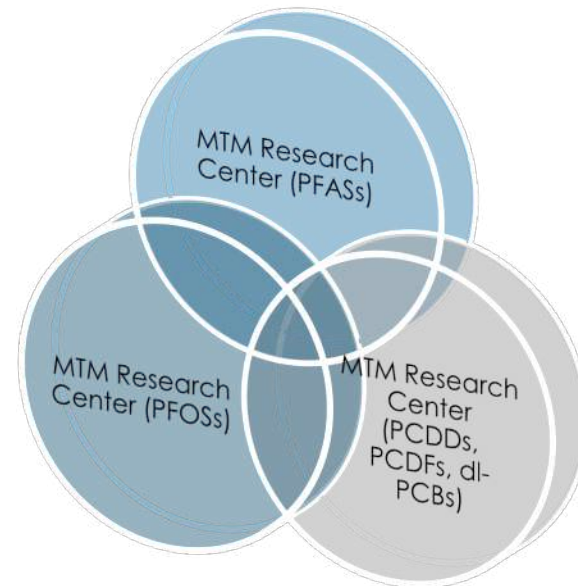
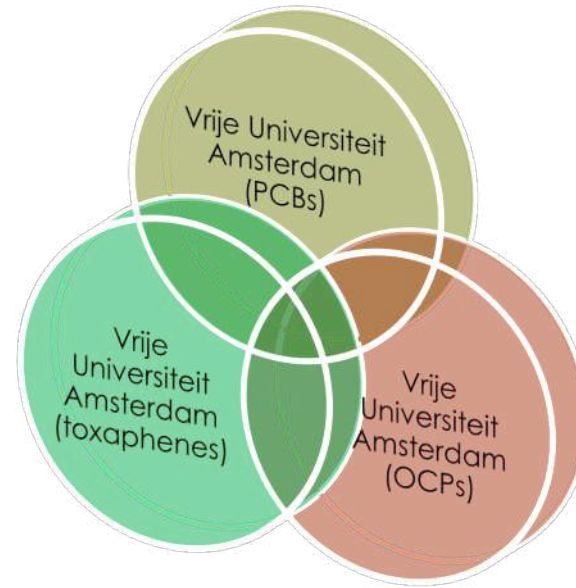
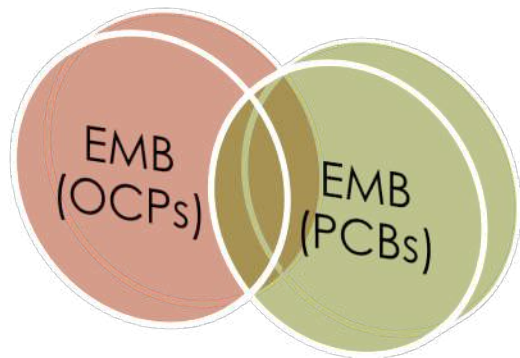
Securing conditions for sustainable POPs monitoring

Component 5

For the passive air sampling, the sampling station was installed at the AGROMET, about 70.2 kms South of Manila. This is a weather monitoring station within the compound of the University of the Philippines. It was selected on the basis of the criteria provided in the Passive Air Sampling (PAS) procedure document.



- Two (2) of the eight (8) passive air samples that were collected for each sampling event, were designated to be analyzed by the EMB Central Office Laboratory; one for selected organochlorine pesticides (OCPs) and another for polychlorinated biphenyls (PCBs). The others were sent to international expert laboratories for analysis.



# Perfluorinated and Polyfluorinated Alkyl Substances (PFASs) and selected precursors

- analyzed by the expert laboratory in Sweden
  - linear and branched perfluorooctane sulfonate (Land br-PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonate (PFHxS), fluorooctane sulfonamide (FOSA), N-methyl fluorooctane sulfonamide (NMeFOSA), Nethyl fluorooctane sulfonamide (NEtFOSA), N-methyl fluorooctane sulfonamidoethanol (NMeFOSE), and N-ethyl fluorooctane sulfonamidoethanol (NEtFOSE)
- Majority of the data for the PUFs submitted were “not reported”, indicated as NR in the results, as the PFASs could not be quantified due to relatively low recoveries of the labeled internal standards.
- Among the PUFs sent, only the **PHL (2019-I)** PUF were analyzed to contain **L-PFOS at 51 pg/PUF** and **br-PFOS at 12 pg/PUF**, amounting to a total of 62 pg/PUF of PFOS. For the case of **PFHxS, 12 pg/PUF** was detected in the same PUF and PFOA is less than the Limit of Quantitation (LOQ) of 13 pg/PUF.



# Polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and Dioxin-like Polychlorinated Biphenyls (dl-PCBs)

- The expert laboratory in Sweden analyzed all the 17 toxic congeners of PCDDs and PCDFs as well as the 12 dioxin-like PCBs.
- Based on the results provided for the three (3) PUFs analyzed for 2018, 9.07 pgTEQ/PUF for PCDDs and PCDFs while 1.99 pg-TEQ/PUF was reported for dioxin-like PCBs. This resulted to a total TEQ of 11.07 pg-TEQ/PUF. In 2019, relatively larger values were reported despite having analyzed only two (2) PUFs for this year. PCDD and PCDF quantities resulted in a total of 10.55 pg-TEQ/PUF, while that for dl-PCBs resulted to 2.80 pg-TEG/PUF. This gave a total TEQ of 13.35 pgTEQ/PUF.

# Brominated Flame Retardants (Polybrominated Diphenyl Ethers (PBDE), Polybrominated biphenyl (PBB), and Hexabromocyclododecane (HBCD))

- For this class of Persistent Organic Pollutants, a total of 13 compounds were analyzed. PBDE congeners reported include BDE 17, BDE 28, BDE 47, BDE 99, BDE 100, BDE 153, BDE 154, BDE 183, and BDE 209.
- For these, the reported values are either less than the LOD or in between the LOD and LOQ of the method used.
- On the case of **PBB**, only **congener 153** was analyzed and all the reported results for the five (5) samples were **below the method's LOQ** value of 0.08 ng/PUF.
- HBCD forms analyzed included  $\alpha$ -HBCD,  $\beta$ -HBCD, and  $\gamma$ -HBCD.

# P B D E , deca B D E , P B B and H B C D concentrations in ng/P U F

BFR	PHL-9 (2018-I)	PHL-9 (2018-II)	PHL-9 (2018-III)	PHL-9 (2018-IV)	PHL-9 (2019-I)	PHL-9 (2019-II)	PHL-9 (2019-III)	PHL-9 (2019-IV)
BDE17	<0.10	<0.10	<0.10		*0.13	<0.10		
BDE28	<0.18	<0.18	<0.18		<0.18	<0.18		
BDE47	*0.36	*0.45	0.51		*0.46	*0.34		
BDE99	*0.17	<0.09	*0.28		*0.20	*0.11		
BDE100	<0.08	<0.08	<0.08		*0.10	<0.08		
BDE153	<0.17	<0.17	<0.17		<0.17	<0.17		
BDE154	<0.14	<0.14	<0.14		<0.14	<0.14		
BDE183	<0.33	<0.33	<0.33		<0.33	<0.33		
BDE209	<1.2	<1.2	<1.2		<1.2	NA		
PBB153	<0.08	<0.08	<0.08		<0.08	<0.08		
α-HBCD	*0.05	*0.04	*0.05		*0.05	<0.03		
β-HBCD	*0.05	<0.03	*0.05		<0.03	<0.03		
γ-HBCD	<0.03	<0.03	<0.03		<0.03	<0.03		

\*:

Between limit of detection (LOD) and limit of quantification (LOQ)

NA: not analysed



Not sampled or lost during shipment

# Polychlorinated Biphenyls (PCBs)

- The EMB Central Office Laboratory performed analysis of PCBs using its established methodology based on the methods of the United States Environmental Protection Agency (US EPA). This includes **19 PCB Congeners** spanning from low-chlorinated to highly chlorinated PCB congeners to ensure representation of the entire 209 PCB congeners.
- Of these 19, three (3) congeners are included in the indicator PCBs analyzed under this project, namely, **PCB 138, PCB 153 and PCB 180**.
  - Other indicator PCBs analyzed by the expert laboratory are PCB 28, PCB 52 and PCB 101; these are not included in the 19 congeners analyzed in the EMB Central Office Laboratory.

# Polychlorinated Biphenyls (PCBs)

- Based on the results of the two laboratories for the three other PCBs, the results are all below **8 ng/PUF**.
  - below the reporting limit of the EMB Central Office Laboratory, set at 8 ng/PUF
  - the reported values of the expert laboratory are all below 8 ng/PUF.
- The analyzed values by the expert laboratory range from 0.35 to 1.7 ng/PUF for all the five PUFs analyzed from 2018 to 2019.
  - The values reported by the expert laboratory was based on gas chromatography with **mass spectrometry**
  - the EMB Central Laboratory used gas chromatography using an Electron Capture Detector (**ECD**) to detect the target analytes.
  - This can be one of the reasons for the difference in LOQs and reporting limits of the two methods used in the reported results.

# PCB Concentrations in ng/P UF




PCB	PHL-1 (2018 - I)	PHL-2 (2018 - I)	PHL-1 (2018 - II)	PHL-2 (2018 - II)	PHL-1 (2018 - III)	PHL-2 (2018 - III)	PHL-1 (2018 - IV)	PHL-2 (2018 - IV)
Old code Philippines		PHL-2 (2016-IV)		PHL-2 (2017-I)		PHL-2 (2017-II)		
1	NA	NA	NA	NA	NA	NA		
5	NA	NA	NA	NA	NA	NA		
18	NA	NA	NA	NA	NA	NA		
<b>28</b>	0.87	NA	0.98	NA	0.98	NA		
31	NA	NA	NA	NA	NA	NA		
44	NA	NA	NA	NA	NA	NA		
<b>52</b>	0.90	NA	1.1	NA	1.2	NA		
66	NA	NA	NA	NA	NA	NA		
87	NA	NA	NA	NA	NA	NA		
<b>101</b>	0.94	NA	1.4	NA	1.6	NA		
110	NA	NA	NA	NA	NA	NA		
<b>138</b>	0.79	< 8.0	1.1	< 8.0	1.7	< 8.0		
141	NA	< 8.0	NA	< 8.0	NA	< 8.0		
151	NA	< 8.0	NA	< 8.0	NA	< 8.0		
<b>153</b>	*0.72	< 8.0	*1.0	< 8.0	1.5	< 8.0		
170	NA	< 8.0	NA	< 8.0	NA	< 8.0		
<b>180</b>	*0.40	< 8.0	*0.51	< 8.0	*0.84	< 8.0		
183	NA	< 8.0	NA	< 8.0	NA	< 8.0		
187	NA	< 8.0	NA	< 8.0	NA	< 8.0		
206	NA	< 8.0	NA	< 8.0	NA	< 8.0		

PCB	PHL-1 (2019 - I)	PHL-2 (2019 - I)	PHL-1 (2019 - II)	PHL-2 (2019 - II)	PHL-1 (2019 - III)	PHL-4 (2019 - III)	PHL-1 (2019 - IV)	PHL-2 (2019 - IV)
Old code Philippines		PHL-2 (2017-III)		PHL-2 (2017-IV)		PHL-4 (2018-I)		
1	NA	NA	NA	NA		< 15		
5	NA	NA	NA	NA		< 15		
18	NA	NA	NA	NA		< 15		
<b>28</b>	*0.89	NA	*1.1	NA		NA		
31	NA	NA	NA	NA		< 15		
44	NA	NA	NA	NA		< 15		
<b>52</b>	0.93	NA	1.5	NA		< 15		

66	NA	NA	NA	NA		< 15		
87	NA	NA	NA	NA		< 15		
101	1.1	NA	1.6	NA		< 15		
110	NA	NA	NA	NA		< 15		
<b>138</b>	*0.99	< 8.0	1.2	< 8.0		< 15		
141	NA	< 8.0	NA	< 8.0		< 15		
151	NA	< 8.0	NA	< 8.0		< 15		
<b>153</b>	*0.81	< 8.0	1.0	< 8.0		< 15		
170	NA	< 8.0	NA	< 8.0		< 15		
<b>180</b>	*0.35	< 8.0	*0.37	< 8.0		< 15		
183	NA	< 8.0	NA	< 8.0		< 15		
187	NA	< 8.0	NA	< 8.0		< 15		
206	NA	< 8.0	NA	< 8.0		< 15		

\*: Between limit of detection (LOD) and limit of quantification (LOQ)

NA: not analysed

	Analysis at the VUA
	Analysis carried out in the Philippines
	Not sampled or lost during shipment

# Organochlorine Pesticides (OCPs)

- The OCPs analyzed by both laboratories include compounds, namely,  $\alpha$ -HCH,  $\beta$ -HCH, lindane ( $\gamma$ -HCH), heptachlor, cis-heptachlor epoxide,  $\alpha$ -endosulfan, aldrin, dieldrin, endrin, cis-chlordane, trans-chlordane, and 4,4'-DDE.
- For these compounds, **70%**, equivalent to 42 pairs of results from the expert laboratory and the national laboratory, agree in terms of the reported values.
  - The agreement involves detecting, for example,  $< 2.0$  ng/PUF of the target compound and the expert laboratory reporting a value that is indeed below the said quantity using its own approach.
  - Another is the attainment of exactly the same value, 2.8 ng/PUF for sample 2019-I for cis-chlordane.

# Organochlorine Pesticides (OCPs)

- Apart from the above-mentioned POPs, the expert laboratory also reported values for trans-heptachlor epoxide, cis-nonachlor, trans-nonachlor, oxychlorodane, 2,4'-DDT, 4,4'-DDT, 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, hexachlorobutadiene, pentachlorobenzene, hexachlorobenzene, and mirex. The highest value reported for these analytes was 4.1 ng/PUF trans-nonachlor from 2019-II while the lowest value reported above the LOQ is 0.2 ng/PUF 2,4'-DDE from 2018-II.
- The EMB Central Laboratory is developing its capability to analyze these pesticides as well using the UNEP method provided during the capacity-building activity under this project to expand further its POPs testing capabilities.



# OCP Concentrations in ng/P UF

OCP	PHL-1 (2018-I)	PHL-2 (2018-I)	PHL-1 (2018-II)	PHL-2 (2018-II)	PHL-1 (2018-III)	PHL-2 (2018-III)	PHL-1 (2018-IV)	PHL-2 (2018-IV)
<b>Old code Philippines</b>		PHL-2 (2016-IV)		PHL-2 (2017-I)		PHL-2 (2017-II)		
$\alpha$ -HCH	*0.69	<2.0	*0.49	<2.0	*0.31	<2.0		
$\beta$ -HCH	<0.83	<2.0	<0.83	<2.0	<0.83	<2.0		
$\delta$ -HCH	NA	<2.0	NA	<2.0	NA	<2.0		
Lindane ( $\gamma$ -HCH)	*0.38	<2.0	0.49	4.50	0.80	<2.0		
Heptachlor	1.4	<2.0	1.2	<2.0	1.3	<2.0		
Cis-Heptachlor epoxide	0.70	<2.0	0.84	<2.0	0.87	<2.0		
Trans-Heptachlor epoxide	<1.2	NA	<1.2	NA	<1.2	NA		
$\alpha$ -Endosulfan	<0.15	<2.0	1.3	2.1	1.9	<2.0		
$\beta$ -Endosulfan	NA	<2.0	NA	<2.0	NA	<2.0		
Endosulfan sulfate	NA	<2.0	NA	<2.0	NA	<2.0		

Aldrin	<0.05	<2.0	<0.05	<2.0	<0.05	<2.0		
Dieldrin	3.1	<2.0	3.7	<2.0	4.2	<2.0		
Endrin	<0.25	<2.0	*0.25	<2.0	*0.49	<2.0		
Endrin Aldehyde	NA	NA	NA	NA	NA	NA		
Endrin Ketone	NA	NA	NA	NA	NA	NA		
Cis-chlordane	2.8	<2.0	3.8	2.0	3.9	<2.0		
Trans-chlordane	4.1	4.20	5.7	5.00	5.9	<2.0		
Cis-nonachlor	*0.86	NA	*0.97	NA	<0.77	NA		
Trans-nonachlor	*2.9	NA	3.7	NA	3.7	NA		
Oxychlordane	<1.2	NA	<1.2	NA	*1.4	NA		
2,4'-DDT	0.4	NA	0.57	NA	0.70	NA		
4,4'-DDT	9.3	NA	2.0	NA	2.4	NA		
2,4'-DDD	<0.11	NA	*0.14	NA	*0.21	NA		
4,4'-DDD	0.70	NA	0.40	NA	0.43	NA		
2,4'-DDE	0.18	NA	0.20	NA	0.21	NA		
4,4'-DDE	*1.2	<2.0	1.4	<2.0	1.9	<2.0		
HCBD	1.2	NA	1.6	NA	1.9	NA		
Pentachlorobenzene	0.76	NA	0.52	NA	0.69	NA		
Hexachlorobenzene	2.8	NA	1.9	NA	3.2	NA		
Methoxychlor	NA	<2.0	NA	<2.0	NA	<2.0		
Mirex	0.13	NA	0.12	NA	0.17	NA		




# OCP Concentrations in ng/P UF

OCP	PHL-1 (2019 - I)	PHL-2 (2019 - I)	PHL-1 (2019 - II)	PHL-2 (2019 - II)	PHL-1 (2019 - III)	PHL-2 (2019 - III)	PHL-1 (2019 - IV)	PHL-2 (2019 - IV)
<b>Old code Philippines</b>		PHL-2 (2017 - III)		PHL-2 (2017 - IV)		PHL-2 (2018- I)		
$\alpha$ -HCH	*0.29	<2.0	*0.31	<2.0		<30		
$\beta$ -HCH	<0.82	<2.0	<0.82	<2.0		<30		
$\delta$ -HCH	NA	<2.0	NA	<2.0		<30		
Lindane ( $\gamma$ -HCH)	<0.58	<2.0	*0.72	<2.0		<30		
Heptachlor	*0.63	2.1	*0.73	<2.0		<30		
Cis-Heptachlor epoxide	<0.59	<2.0	<0.59	<2.0		<30		
Trans-Heptachlor epoxide	<1.0	NA	<1.0	NA				
$\alpha$ -Endosulfan	*0.90	4.70	*1.2	4.2		<30		
$\beta$ -Endosulfan	NA	<2.0	NA	<2.0		<30		

Endosulfan sulfate	NA	<2.0	NA	<2.0		<30		
Aldrin	*0.20	<2.0	*0.17	<2.0		<30		
Dieldrin	2.2	<2.0	4.8	<2.0		<30		
Endrin	<0.21	<2.0	<0.21	<2.0		<30		
Endrin Aldehyde	NA	NA	NA	NA		<30		
Endrin Ketone	NA	NA	NA	NA		<30		
Cis-chlordane	2.8	2.80	4.4	4.1		<30		
Trans-chlordane	4.3	11.1	6.2	<2.0		<30		
Cis-nonachlor	<0.71	NA	<0.71	NA		NA		
Trans-nonachlor	2.4	NA	4.1	NA		NA		
Oxychlordane	<1.1	NA	<1.1	NA		NA		
2,4'-DDT	0.44	NA	0.46	NA		NA		
4,4'-DDT	1.3	NA	1.7	NA		<30		
2,4'-DDD	*0.20	NA	*0.21	NA		NA		
4,4'-DDD	*0.29	NA	*0.32	NA		<30		
2,4'-DDE	<0.23	NA	<0.23	NA		NA		
4,4'-DDE	1.1	<2.0	1.3	<2.0		<30		
HCBD	<0.23	NA	0.93	NA		NA		
Pentachlorobenzene	0.63	NA	0.76	NA		NA		
Hexachlorobenzene	1.9	NA	1.8	NA		NA		
Methoxychlor	NA	<2.0	NA	<2.0		<30		
Mirex	<0.11	NA	<0.11	NA		NA		

\*: Between limit of detection (LOD) and limit of quantification (LOQ)

NA: not analysed

	Analysis at the VUA
	Analysis carried out in the Philippines
	Not sampled or lost during shipment

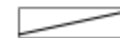
# Toxaphene

- For this target compound, the expert laboratory in The Netherlands analyzed three (3) toxaphene Parlar congeners which included **P26, P50 and P62** in the three (3) PUFs received in 2018 and the two (2) PUFs in 2019.



Toxaphene	PHL-9 (2018 - I)	PHL-9 (2018 - II)	PHL-9 (2018 - III)	PHL-9 (2018 - IV)	PHL-9 (2019 - I)	PHL-9 (2019 - II)	PHL-9 (2019 - III)	PHL-9 (2019 - IV)
CHB26	*0.17	*0.18	*0.19		*0.18	*0.18		
CHB50	<0.42	<0.42	<0.42		<0.42	<0.42		
CHB62	<0.50	<0.50	<0.50		<0.50	<0.50		

\*: Between limit of detection (LOD) and limit of quantification (LOQ)



Not sampled or lost during shipment

# Training and Capacity-Building

Two capacity building exercise was provided by the project. One is with Dr. de Boer who provided the theoretical part of the training and the other with Mr. Martin van Velzen who provided the actual laboratory training on analysis



## Participation to the Bi-ennial Global Interlaboratory Assessment on Persistent Organic Pollutants – Fourth Round 2018/2019

The EMB Central Office Laboratory participated in the above-mentioned activity as part of the country's involvement to the GMP2 Project.

- In particular, the results reported were for organochlorine pesticides, indicator PCBs and dioxin-like POPs in test solutions, sediments, biota and air extracts.
- the EMB Central Laboratory submitted a total of 29 satisfactory results consisting of five results for OCPs, 11 results for indicator PCBs and 13 results for dioxin-like POPs.
- The methods used in the analysis of OCPs and PCBs, for example, are the methods introduced during the capacity-building component of the project and not the already established methods of the EMB Central Office Laboratory.

# Involvement in other monitoring activities and networks

- The Environmental Management Bureau is currently involved with the Persistent Organic Pollutants Monitoring Network in East Asia (**POPsEA**) Project in partnership with the Ministry of Environment – Japan through the Japan Environmental Sanitation Center.
- The project aims to **enhance monitoring capability for POPs** of east Asian countries, with Japan and South Korea providing the technical guidance and training.
  - Moreover, the project also **assists the member countries** in contributing to the effectiveness evaluation requirement of the Stockholm Convention through **conduct of ambient air monitoring** in identified background sites in each country and analyzing these for a variety of POPs.

# Sustainability Plan

- Although chemical management in the Philippines is not a priority program, the foundation of chemical management is already in place. The Philippines already has a chemical inventory through the Philippine Inventory of Chemicals and Chemical Substances (**PICCS**), there is already an existing law, **Republic Act 6969**, governing chemical management and being a Party to Multilateral Environmental Agreements (MEAs), particularly the **Stockholm Convention** on POPs.
  - As a Party to the Stockholm Convention, the Philippines has already developed its National Implementation Plan, thereby institutionalizing the action plans on the phase out and monitoring of POPs in the country

# Sustainability Plan

In order to sustain the works and outputs which the projects has done, the following needs to be ensured:

- Strengthening the implementation of policies, laws and regulations related to POPs.
- Development of new policies on POPs in relation to emerging global issues on POPs.
- Strengthen involvement of private sector and local government units in monitoring and management of products containing POPs.
- Involvement of the academic sector in gathering of baseline studies on POPs.
- Integrating POPs monitoring in regular chemical monitoring program of the Bureau.
- Capacity building of staff on POPs analysis





# Summary

Overall, the project provided a good learning experience to the Philippines both on the technical aspects of POPs analysis and project implementation.

Through this project, it has provided the Philippines an overview of its capacity, limitations and areas for improvement in relation to POPs analysis.



# Thank you

Environmental Management Bureau –  
Department of Environment and Natural Resources

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Website: [chemical.emb.gov.ph](http://chemical.emb.gov.ph)





# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

## Kiribati perspective

Teema BIKO  
Taulehia Pulefou

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific  
region

Bangkok, Thailand 4-5 April 2023



## Kiribati perspective – summary of activities

### Water sampling – completed 2017/18



Month - Year	Parameter	Value
Jul-17	PFOS (pg/l)	1926.05237
	PFOA (pg/l)	174.487308
	PFHxS (pg/l)	1622.43454
Oct-17	PFOS (pg/l)	613.429314
	PFOA (pg/l)	91.9896021
	PFHxS (pg/l)	360.767846
Jan-18	PFOS (pg/l)	1680.448
	PFOA (pg/l)	119.288
	PFHxS (pg/l)	196.416
Mar-18	PFOS (pg/l)	1026.67734
	PFOA (pg/l)	131.218244
	PFHxS (pg/l)	256.731346
Jul-18	PFOS (pg/l)	422.338597
	PFOA (pg/l)	107.815311
	PFHxS (pg/l)	151.189286
Oct-18	PFOS (pg/l)	79.8081151
	PFOA (pg/l)	66.1762942
	PFHxS (pg/l)	41.143314
Mar-19	PFOS (pg/l)	4699.6
	PFOA (pg/l)	246.76
	PFHxS (pg/l)	1785.6

## Kiribati perspective – summary of activities

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### Air Sampling – 2017/2018

- POP GMP I 2008 -2012 & POP GMP II – 2016 present
- Site change from previous location in POP GMP 1 project 2010
- Completeness was met for parameters measured in 2017 to 2018
- Air monitoring in 2010 was almost six months for both sites, but did not cover the same weeks, nine months in 2017 and one year in 2018
- Completeness criterion was not met in 2010



## Kiribati perspective – CONT..

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### Milk survey

- WHO milk survey in 2005
- UNEP GEF POPs GMP I – 2009
- UNEP GEF POPs GMP II - 2017
- No individual samples analysis for Kiribati for basic POPs

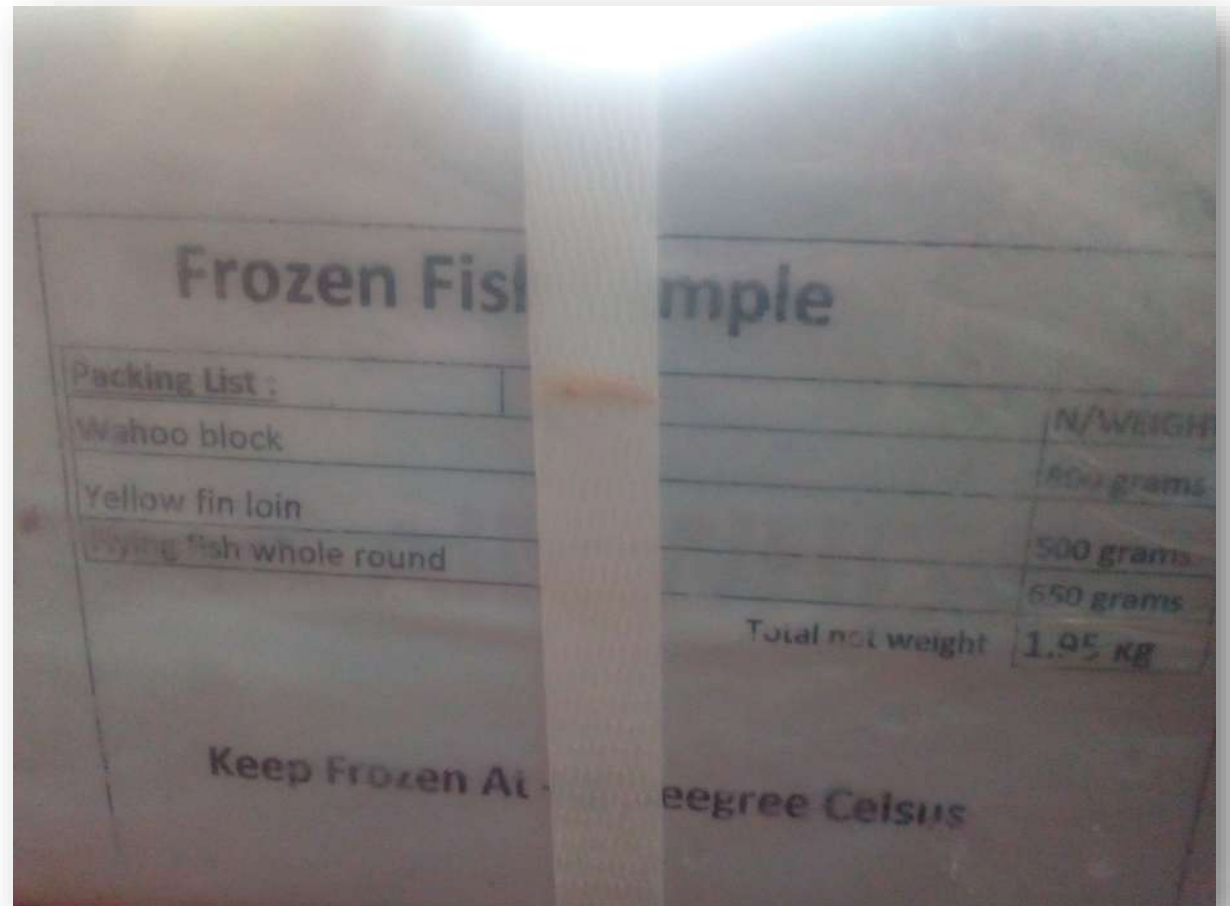


## Kiribati perspective – CONT..

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### Fish sampling - 2019

- Kiribati Fish Limited, Fisheries Competent Authority, and Nutrition of Ministry of Health in collection and preparation of fish samples to ensure international freight requirements are met
- Completed in 2019 – targeting yellow fin tuna, wahoo, and flying fish  
However, samples never sent due to strict policy of DHL local courier on perishable products



## Kiribati perspective – CONT..

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### National analysis – finalizing report

- draft report is being finalized by MELAD
  - Cabinet will inform on the results
  - Awareness materials will be prepared based on the results (Kiribati language)
-

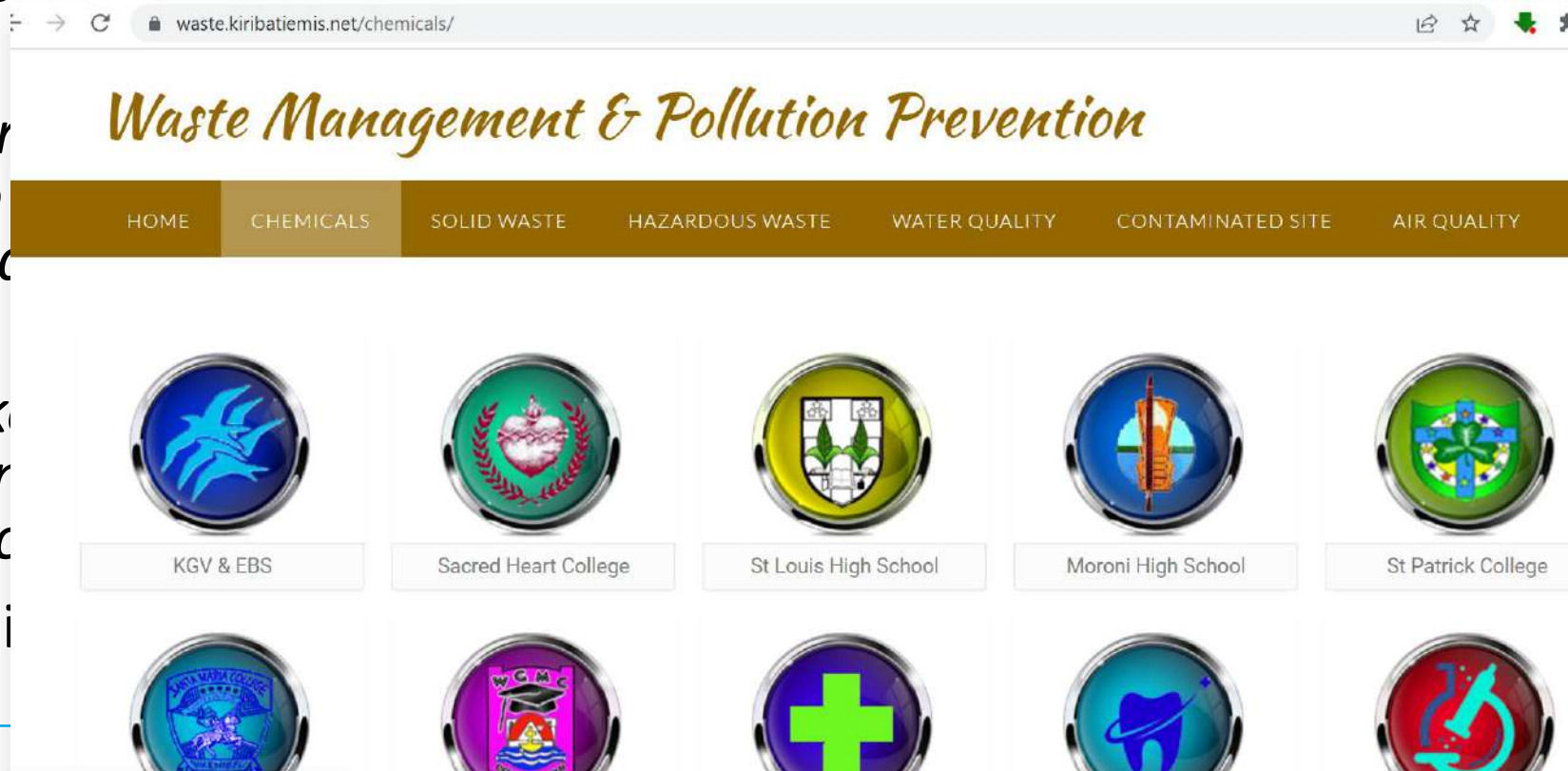


## Kiribati perspective – EXTRA ACTIVITIES

- *Develop a guidance to interpret POPs monitoring results in context of local circumstances.*
- *Established central information management system to information sharing, use monitoring results*
- *Hold meeting with stakeholders to communicate POPs monitoring results for national policy*
- *Develop awareness raising materials*

### Status

Kiribati results were analysis IC. Results has been presented to key stakeholders. National



# Summary of Results of Human Milk Matrix

- Data are available in aggregated format from three Human Milk Surveys, Rounds 4, 5 and 6, years 2006, 2011 and 2018.
- The parameters measured in 2018 were 120 of which 25 were measured for the first time.
- Changes in concentration were assessed from aggregate data of 95 parameters between the median values of the three rounds:
  - Most of the OCPs: Cyclodienes, DDTs, Toxaphene, HCH and PeCB, in 2018 present values below the limit of quantification, as well as PBB 153, PCPs, HCB, Dicofol, and most HBCD.
  - There are decreases in the concentrations of all Cyclodienes, DDTs, HCB, HCH, Toxaphene, TEQs, PBB 153 and most congeners of: dl and indicator PCBs, and PCDDs and PCDFs.
  - There are increases in the concentrations of, PCB 28, Alpha-HBCD, PBDEs, and some congeners of dl PCBs, and PCDFs.
  - The following parameters were measured for the first time in 2018: cis and trans-Nonachlor, Chlordecone, Sum 7 PCBs, BDEs 175/183 and 209, HCB, PCP, PFOS, PFOA, and PFHxS, Dicofol, SCCP and PCN.
  - Insignificant downward trends were observed for Sum 6 DDTs, Sum 6 PCBs, Sum 12 dl-PCBs, Sum 17 PCDDs/Fs and TEQs.

# Summary of the results for Air sampling

- Data available in the GMP DWH from three monitoring sites: 2 in the 2010 period, Beru and Betio, and one in 2017-2018, Bonriki Airport.
- Betio and Bonriki Airport sites were on Tarawa Island, but more than 10 Km away. Beru site, located in Beru island, was more than 430 km away. Therefore, the inconsistency of sites' location did not allow assessment of changes in concentrations or trends.
- The completeness criterion was only met for parameters measured in 2017-2018.
- Comparisons of 46 parameters were performed between the maximum median values of the three sites giving the following results:
  - Most of the OCPs: Cyclodienes, DDTs, and HCHs presented values below the limit of quantification in the period 2017- 2018 Bonriki site, but Mirex presented higher concentrations than those of Beru and Betio sites.
  - Betio site presented the highest values for most of PCDD and PCDF, and TEQs, and Beru site for most OCP and PCB indicators.
  - The following parameters were measured for the first time in 2017 - 2018: dl PCB, PeCB, PBDEs, HBCDs, PBB, PFOs and some Cyclodienes.

# Summary of results for Water Matrix

- Data are available from seven samples of three perfluorinated parameters from one monitoring site during the period 2017-2019. The geographic location was the same throughout the monitoring period, demonstrating consistency.
- Completeness was only achieved in 2018. However, the data can be pooled by merging years to reach two time periods that meet the completeness criterion.
- Comparisons of un-aggregated data showed a possible decreasing seasonal behavior of PFOS from 2017 to 2018.
- Aggregate data comparisons performed in two ways showed increases of PFOS, PFOA and PFHxs for DWH aggregation and decreases from 2017 to 2019 of PFOS, and PFHxs for manual aggregation.

## Project countries perspective

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- Usage of the data/outputs of the GMP project in your country, if any
  - Kiribati is collaboration with GEF Island Programme to explore designing project that will address high level of PFAS in human breast milk
  - March – Kiribati have held a call with GEF team and GEF Island Programme project team to discuss potential project to address PFAS
  - Raise awareness of POPs chemicals and its impact to human/environment to stakeholders and mothers that participated in milk survey
- Translation of the analysis of results - Kiribati
- Use results to design awareness material that fit for all age groups i.e. poster, information for kids etc.

## Project countries perspective

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- Lessons learnt and experiences gained
    - Involving/engaging of key stakeholders (MHMS, MFMRD, KFL etc.) in monitoring has contribute significant to success of monitoring activities and at the same time cost effective
    - Identify key stakeholders to engage in project is important. i.e. Kiribati Competent Authority of MFMRD run monitoring programme to test fish overseas
    - Sending the food samples (perishable products) to laboratory nearby laboratory might be a possible, given short distance
-

## Project countries perspective



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### Consideration for sustainability and future monitoring of POPs

- Some of the chemicals 120 parameters monitored in 2018, 25 were monitored for the first time. Therefore, trend has not been achieved.
- Kiribati is keen to continue with monitoring however lack of the dedicated funds from Government is an issue

### Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building

- Water Quality monitoring led by MHMS and Water Unit of MISE (sampling site of POPs GMP has been sampled by MHMS in previous work)
  - **CA of MFMRD – fish sampling**
  - Training/Capacity building MELAD and key stakeholders attended virtual training on data handling and interpretation delivered by IC in 2021
-



Kam raba  
(Thank you)

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand 4-5 April 2023







# **Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project**

**Project country perspective – Lao PDR**

**Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region**

**Bangkok, Thailand 4-5 April 2023**



## Project countries perspective

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- **Programmes Objective:**

- To implement the GMP for POPs according to article 16 of the Stockholm convention on the effectiveness evaluation, by generating data on the concentrations of POPs in the core media human milk and air.
  - Strengthen the national capacity to implement the global monitoring plan for POPs
  - To develop a sustainable monitoring plan for POPs for the ASIA Region
-

Summary of activities under the project, including among others sampling, national analysis, capacity building, additional activities etc.

I. Coordination, including nomination of project staff and development of a national workplan and timetable – **1. National expert on develop monitoring plan for GMP, 2. National workshop, 3. Coordination between stakeholder**

II. Undertake air sampling (includes servicing of the site, consultation with stakeholders, documentation, shipment of samples, reporting etc.) (7 samplers, 8 PUFs each; total of 56) - **1. Installation the sampling equipment, 2. Chemical, 3. Shipment of samples, 4. Report**

# Awareness raising and policy engagement

- The inception workshop of the “UNEP/GEF POPs GMP project)” was organized on Tuesday, 2<sup>nd</sup> 2018 at the ministry. The objective of the inception workshop is to raise the awareness of participants on introduction of project, project activities and implementation plan as well as sharing the view and experiences of the open burning activities related to POPs on human health and environment.
- The workshop was organized by Environment Research Institute with the representative of participants from various organizations and stakeholders

# Summary of main results and outputs

- Sampling site selection and installation - 65 km Lat:18°29.575' N  
Log:102° 26.943' E
- The Standard Operating Procedures used for the National Samples of sampling work Global Monitoring Plan on Persistent Organic Pollutants has been context of UNEP implemented GEF projects
- National Assessment Report on Implement of POPs Monitoring in Lao PDR
- Eight round of air samples had been collected and send for analysis every three months and samples send to the expert lab MTM Orebro University and Vrije Universiteit, Netherland for Analysis

# Challenges and Lesson Learnt

- Efforts had been spent on conducting human milk survey, including getting national ethical clearance. However, due to lack of capacity, this activity could not be completed as well as the sampling of matrices of were also not undertaken.
- Financial arrangement difficulties

# Opportunities

- Opportunity to develop national monitoring programs of country
- To know the POPs baseline levels,
- To know the concentrations of POPs in environments/matrices of countries' concerns, specific studies like source oriented measurements
- To inform and advise the population
- To develop policies on POPs monitoring and prevention program and to raise awareness of policy decision makers
- To evaluate and identify the impacts and actions need to be taken

- **Consideration for sustainability and future monitoring of POPs**
    - Updated National Implementation Plan
    - (Nip) For Phasing Out and Elimination of Pops Under Stockholm Convention including Develop National Monitoring Program on POPs
    - Awareness raising of publics, government and stakeholders ,
    - Strengthening capacity on POPs monitoring
-





# Thank you

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand 4-5 April 2023





# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

Project country perspective

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific  
region

Bangkok, Thailand 4-5 April 2023

### Overview

- Samoa is a party to the Stockholm Convention; signed in 2001 and ratified in 2002 and therefore obligated to protect human health and the environment with the aim to reduce or eliminate the production, use, trade and storage of POPs.
  - GMP2 was coordinated by MNRE under Division of Environment & Conservation with support from Ministry of Health and other relevant stakeholders.
-

## Samoa

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- Summary of activities
  - Sampling of Water, Air and Human Milk
  - Sampling of National Matrices of Interest
  - Sampling training conducted (Region)
  - Installation of sampling apparatuses



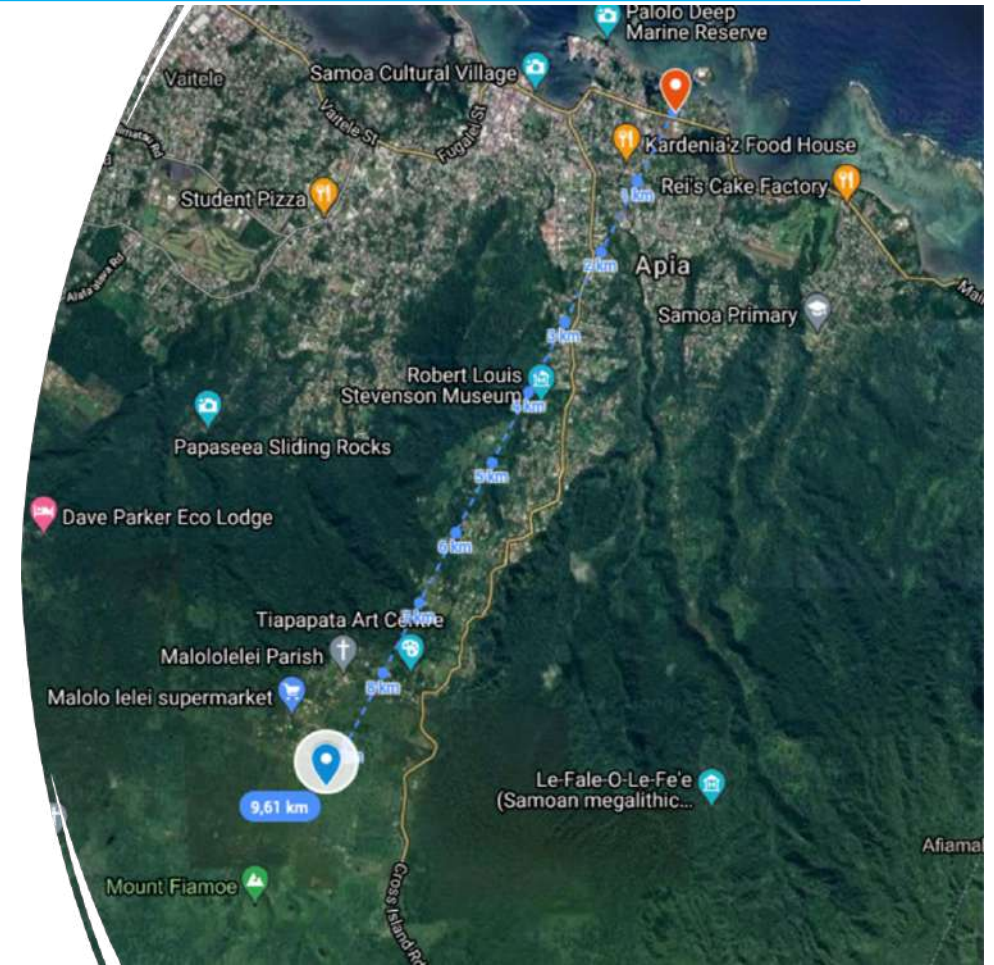
Other Additional Activities include

- ✓ Awareness activities on Pesticides Management
-

## Summary of main results and outputs

### AIR SAMPLING

- Data are available from three monitoring sites: 2 in the period 2010-2011 and one in 2018-2019. However, the sites did not show consistency from one period to another in terms of geographical location.
- Two sites were located within a 10 Km radius in and around Apia city: APIA and Afiamalu Area. However, both have different classification.
- The completeness criterion was only met for some parameters, dl-PCB, PCDD & PCDF, and TEQs, in 2018-2019.
- Comparisons of concentrations of 62 parameters were performed between the APIA and Afiamalu Area sites giving the following results:
  - Most of the OCPs: Cyclodienes, DDTs, HCH and PeCB, in the period 2018 show values below the limit of quantification.
  - There are increases in concentration of congeners of: dl PCB and indicator, and in some PCDD and PCDF, in 2018-2019.
  - The following parameters were measured for the first time in 2018: PeCB, PBDEs, HBCDs, PBB and some Cyclodienes.



# Samoa

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## Geographical location of the Sites:

Country	Site name	Latitude	Longitude	Year	Number of Samples	Site Classification
Samoa	Samoa Vaisigano River	-13.844404	-171.75767	2017	1	Surface
				2018	4	water River
				2019	1	Suburban

## WATER SAMPLING

- Data are available for six samples of three perfluorinated parameters from one monitoring site during the period 2017-2019. The geographic location was the same throughout the monitoring period, demonstrating consistency.
  - Completeness was only achieved in 2018. However, the data can be pooled by merging the years to reach two time periods that meet the completeness criterion.
  - Comparing the disaggregated data shows a possible seasonal behavior of PFOS and PFOA, while PFHxs always presented values below LOQ.
  - Comparison of aggregated data in two ways shows a decrease in PFOS concentration from 2017 to 2019.
-

# Samoa

## HUMAN MILK SAMPLING

- Data are available in aggregated format from 2 Human Milk Surveys, Rounds 5 and 6, years 2011 and 2019.
- The parameters measured in 2019 were 108 of which 19 were measured for the first time.
- Comparisons of the aggregate data concentrations of 89 parameters were performed between the median values of the two rounds:
  - Most of the OCPs: Cyclodienes, DDTs, Toxaphene and PeCB, in 2019 present values below the limit of quantification.
  - There are decreases in the concentration of HCH, and congeners of: dl PCB and indicator, and in most of PCDD and PCDF, in 2019.
  - There are increases in concentration of PBB 153, PCDFs TEQ, 1,2,3,7,8-PeCDF and 2,3,4,7,8-PeCDF.
  - The following parameters were measured for the first time in 2019: PBDEs, HBCDs, HCBd, PCP, PFOS, PFOA, and PFHxS, SCCP and Dicofol.

Country	Monitoring network	Year			
		2011	2017	2018	2019
		Round 5	Round 6		
Samoa	MILK - WHO	87			108

## Samoa

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- Awareness raising and policy engagement

### Recommendations:

- Management of POPs pesticides
  - Management of PFOS, its salts and PFOSF in firefighting foam, insect baits with sulfloramid and metal plating (hard-metal plating) only in closed loop systems
  - Management of PBDEs and HBCD containing products/articles
  - Reduce Releases of Unintentionally formed POPs from Anthropogenic Sources
  - Environmentally Sound Management of POPs Contaminated Sites
  - Research, Development and Monitoring  
Provision of technical and financial assistance
-



## Samoa

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- Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building
  - ✓ Sampling training was conducted at the regional level
  - ✓ collaboration with involved stakeholders such as Ministry of Health (Human Milk Sampling), Water Resources and Meteorology Divisions of MNRE (for Water and Air sampling)
  - ✓ Considerations of the National Review and Updated National Implementation Plans (for POPs) under the Stockholm Convention plans and recommendations.
-

## Samoa

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- Usage of the data/outputs of the GMP project in your country
  - ✓ Data is recorded and will be used to update national inventory of NIP for POPs and for the development of POPs monitoring action plans.
  - ✓ Data could be streamlined in reference to national initiatives of relevance and for sound decision making, within the Environment and other relevant sectors
-

- What will be needed for better use of the data
    - ✓ To strengthen research development and methodologies on POPs impacts on human and environmental health.
    - ✓ To be shared with the health ministry to trace diseases surveillance in the future.
    - ✓ To invest more funds to continue monitoring of POPs to the health of people
-

- Lessons learnt and experiences gained
    - Effective monitoring program for POPs management
    - Significance community participation
    - Continuous monitoring program for comparable data analysis
-

## Samoa

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- Consideration for sustainability and future monitoring of POPs
  - ✓ Strengthen legal and institution arrangements to implement the Convention at the national level
  - ✓ To improve/upgrade national laboratories capacity for data analysis
  - ✓ Conduct more trainings and technical capacity buildings for national laboratory technicians and technical expertise on POPs sampling and data analysis.
  - ✓ Increase public awareness on POPs impacts in the environment and health.
  - ✓ Measures to disseminate information on POPs, public awareness and education on POPs
-



# Thank you

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand 4-5 April 2023



# Solomon Is.

## Global Monitoring Plan Phase II Project



A PRESENTATION BY: Michael P Suinao

Ministry of Environment Climate Change Disaster  
Management & Meteorology  
Solomon Islands

# Outline of Presentation

- Overview of the Project activities in Solomon Islands
- Resources/Facilities Available
- Progress until present
- Challenges and possible solutions
- Lessons learnt
- \GMP project's outcomes /benefit
- Opportunities, collaborations and networks
- Sustainability in monitoring and future expectations

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# Overview of Project Activities in Solomon Is



- Main Activities – undertake air sampling, water sampling , implement the 6<sup>th</sup> round of human milk survey , undertake sampling of matrices of major national interest & Draft national report presenting implementation & monitoring results and contribute to the development of a sustainable regional monitoring plan
- Policy & Legislative framework – National Implementation Plan 2018, NWMPC Strategy 2017-2026, Environment Act, Safety at Work Act, Pharmacy & Poisons Act

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# Resources/Facilities Available

- **Human Resources-** Environment Officers conduct samplings for ambient air & water + shipment of samples
  - Health Officers to conduct human milk sampling
- **Logistics support-**Office vehicle utilized
- **Political Support** – Endorsement of National Waste Management & Pollution Control Strategy in 2017 and National Implementation Plan for Stockholm Convention on Persistent Organic Pollutants (POPs) in 2018.

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# Resources Utilized

- **Facilities**

- ✓ National Public Health Laboratory
  - Tests for WQ covers e.coli, DO, salinity & arsenic but not for POPs
- ✓ Private Laboratory ( SPE Analytical)
  - Soil sampling tests covers phosphorus, nitrogen, soil texture, organic compounds, colouring & carbon but not on POPs.
  - Water quality tests covers pH, conductivity, Dissolved oxygen, salinity, e.coli but not heavy metals or POPs

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# Progress until 2019

- GMP II National Inception held in 2016
- Sampling sites identified in 2016
- PUFs/Passive air sampling first installed in 2017
- 3 water samplings & passive air samplings conducted
- 2 shipments of water samples & passive air samples done in 2018
- Ethics committee approval to conduct breast milk sampling



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# Challenges & Solutions

Challenges	Solutions
Lack of familiarizing with water & ambient air sampling procedures	Read the Sampling procedures a day before the sampling date
Sampling site next to ongoing building construction	Conduct the sampling behind the construction barrier & wear Reflector vests
Logistics vehicle sometimes busy with other office tasks	Hire a taxi/vehicle to conduct the sampling
Lack of ability of National Labs to do laboratory work on POPs	Seek funding support to upgrade national laboratory

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## Challenges

Shipment preparation & logistics can be time consuming

PUFs/PAS breeding site for some insects pose a risk to officers



## Solutions

Prepare supporting paperwork for shipment a day ahead before shipment

Use a long stick or ruler to remove the nest

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# Lessons Learnt

- Team work when conducting samplings to enhance each others capacity to do proper sampling
- Coordination between stakeholders to maintain good networking & collaboration
- Cross-check shipment paperwork to ensure that there is no error by a second person
- Preparation of shipment paperwork before date for shipment

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# Project Outcomes /Benefits

- Builds/strengthen the capacity of officers to monitor POPs concentration or to conduct proper sampling
- Government officers better equipped with scientific or technical knowledge & tools to a high standard
- Data collection on air, water , human exposure to POPs relevant for decision making /Policy /Legislation
- Increased awareness of POPs exposure amongst stakeholders
- Helps Government to provide inputs to the Stockholm Convention & to facilitate reporting

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# Opportunities, Collaborations & Networks

- Creates new networking through a multi-stakeholder approach
- Builds on existing networking or coordination with stakeholders
- Information dissemination and awareness : Example, awareness during international World Environment Day (WED).



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# Opportunities, Collaborations & Networks



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## Sustainability & Future Expectations

- Harmonization of existing legislations to manage sound chemical management
- Maintain POPs sampling sites
- Incorporate POPs monitoring into National Planning & Budget
- Seek funding support to upgrade existing National Government Facility to analyze POPs in the country
- Separate Chemical Unit and Human resources to be responsible for Chemical Management within the MECDM

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The image features a faded, light-colored coat of arms of the Solomon Islands in the background. The coat of arms includes a central shield with a yellow and green design, a crown on top, and a banner at the bottom with the motto "TO LEAD IS TO SERVE".

**Thank you for listening !**

**Solomon Is.**

# POPs Monitoring in Thailand

Waste and Hazardous Substances Management Division,  
Pollution Control Department, Thailand



# Implementation of the POPs Monitoring

POPs in the point sources and surrounding (core media and air) before 2017

- Waste incinerator plants
- Power plants and steel plants
- Crematories



POPs in the core media, human milk and air (2017-present)

- River Sediment
- Fish
- Beef
- Egg
- Water

# Implementation of the POPs Monitoring



# Implementation of the POPs Monitoring Plan in the Asia Region-GMP 2

- UNEP Chemicals and Waste Branch is now continuing its regional support to the GMP with a **second wave** of regional projects (GMP2) from **2016 to 2019**.
- These projects are implemented with the assistance of GEF funds and substantial **co-financing from participating countries**, institutions, universities and the BRS Secretariat.
- the 7 implementing countries in the **Asia Region**, namely Cambodia, Indonesia, Mongolia, Lao PDR, the Philippines, **Thailand**, and Vietnam



# GMP2

- To implement the GMP for POPs according to article 16 of the Stockholm Convention on the effectiveness evaluation, by generating data on the **concentrations of POPs in the core media, human milk and air**. The activities will strengthen **the national capacity to implement the Global Monitoring Plan for POPs**
- To develop a sustainable monitoring plan for POPs for the Asia Region



Objectives		Activities
To build capacity and generate data on analysis of core abiotic matrices (air and water)	>>>	Two years of passive air sampling and <b>water sampling</b>
To build capacity and generate data on analysis of core biotic matrices (human milk)	>>>	One round of human milk sampling
Assess existing <b>analytical capacities</b> and reinforce <b>national POPs monitoring</b>	>>>	<b>Two rounds of interlaboratory assessments and national samples (co-finance)</b>
Secure conditions for sustainable POPs monitoring	>>>	Workshops and development of a roadmap for the region

# Co-ordination Mechanism

National Subcommittee on Stockholm Convention under NEB

Approved Air Sampling Site at "Wachiralongkorn Dam" located in the western region in Apr 2016

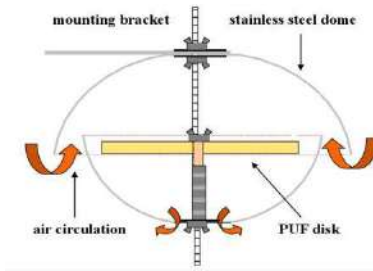
Approved FPH, TU to carry out GMP2 Asia in Aug 2017

Approved what kinds of national matrix samples in July 2018

Established the Working Group on POPs Monitoring in Feb 2018

# Passive air sampling

@ reference site by changing PUFs every 3 months



# POPs in Air sampler

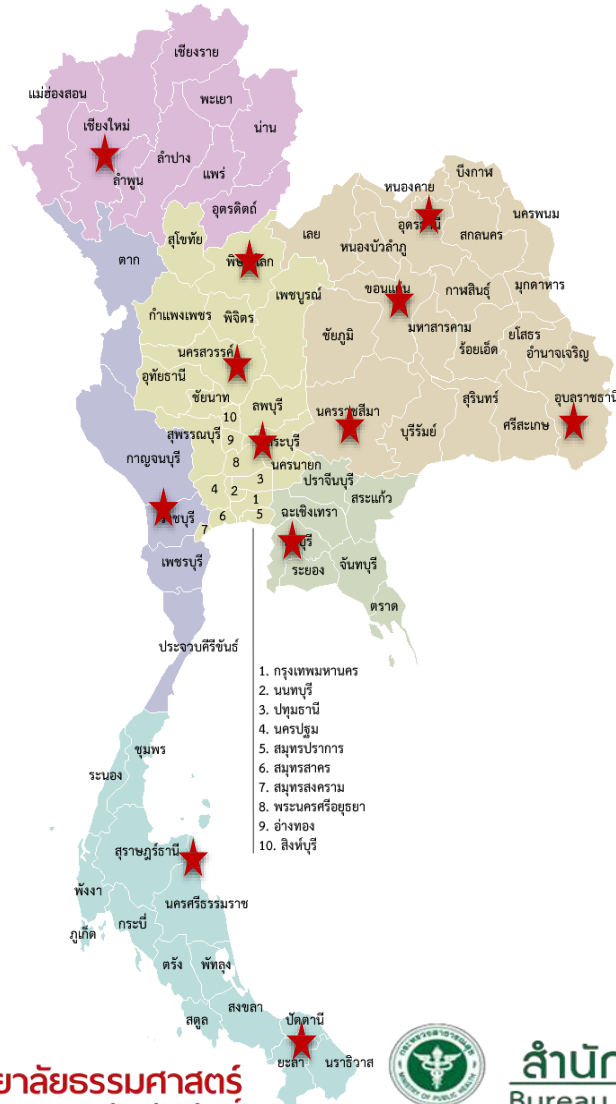
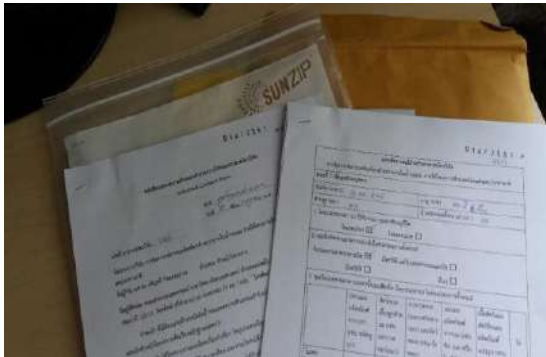
## National Laboratory

- Analysis of PCDD, PCDF and dioxin-like PCB
- Analysis of PFOS

## Reference Laboratory

- Analysis of Basic-POPs pesticides
- Analysis of Basic-POPs PCB indicators
- Analysis of PCDD, PCDF and dioxin-like PCB
- Analysis of PFOS
- Analysis of brominated POPs (PBDE, HBCD y PBB)

# Human Milk Sampling Activity



มหาวิทยาลัยธรรมศาสตร์  
 คณะสาธารณสุขศาสตร์



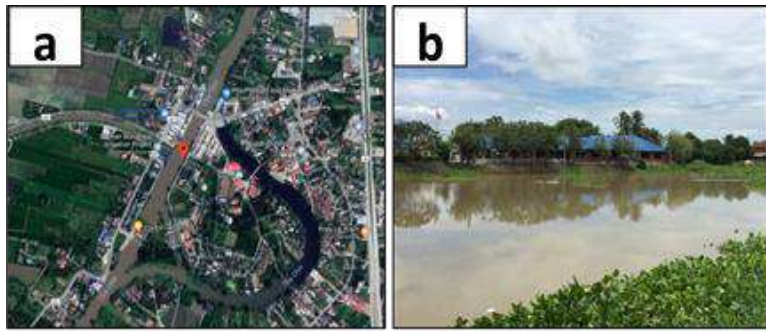
สำนักส่งเสริมสุขภาพ  
 Bureau of Health Promotion



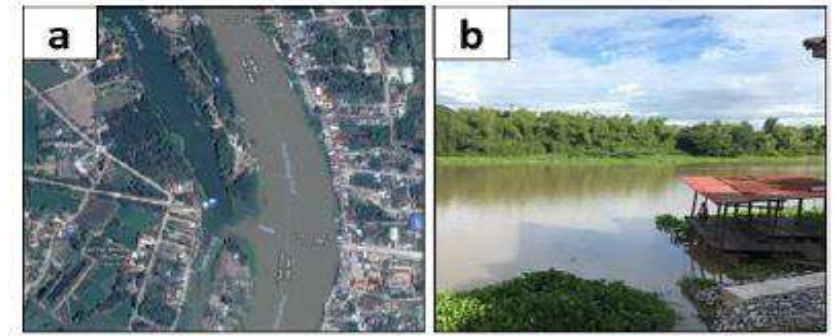
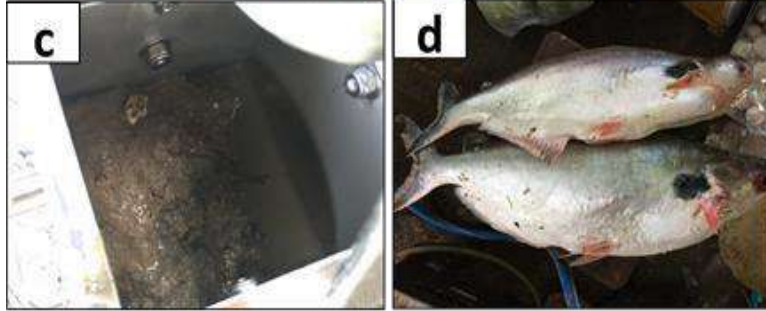
# Core Media Sampling Activity



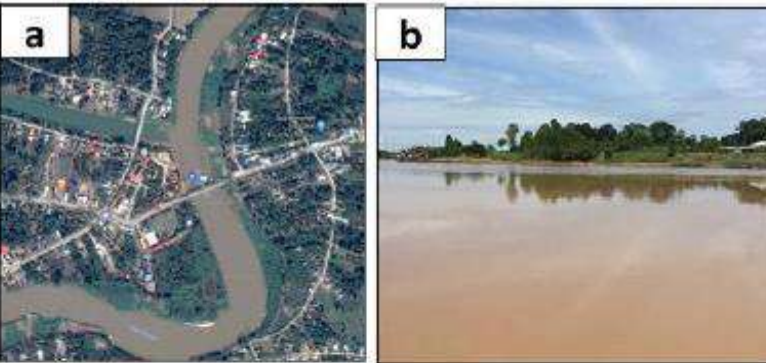
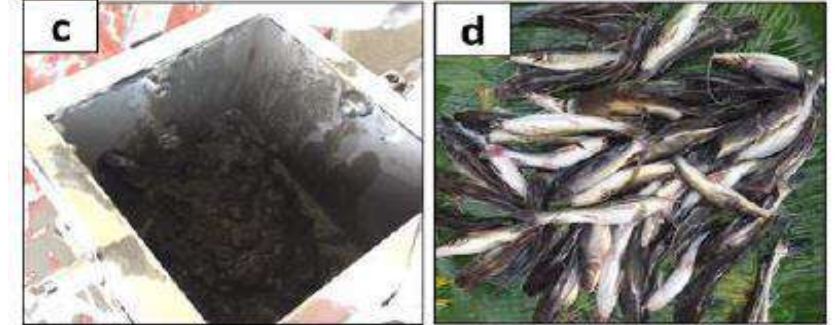




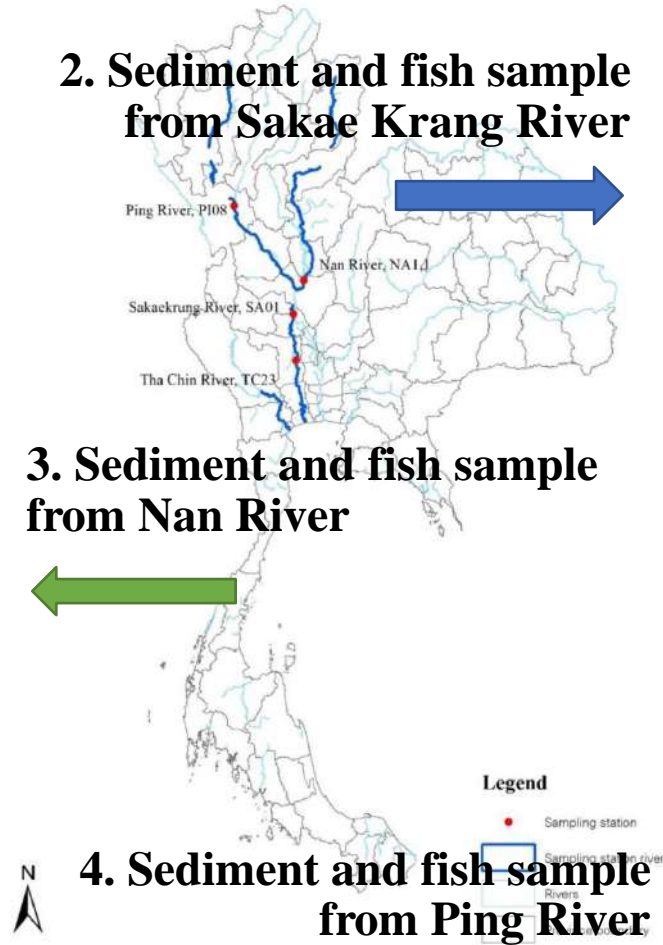
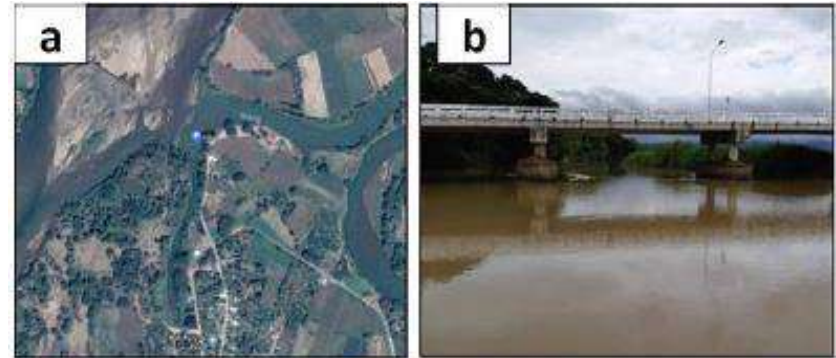
**1. Sediment and fish samples from Tha Chin River**



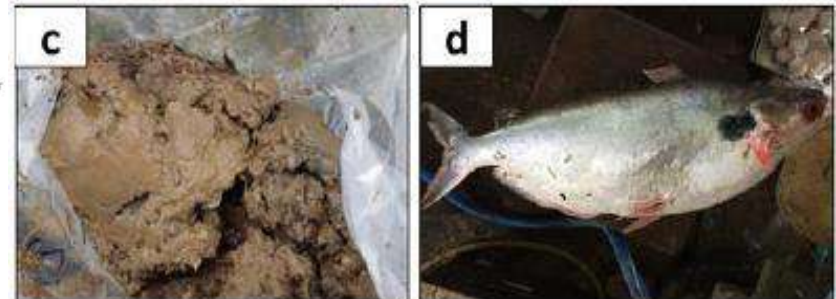
**2. Sediment and fish sample from Sakae Krang River**

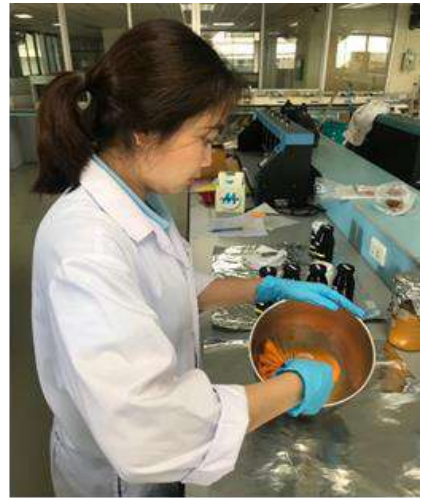
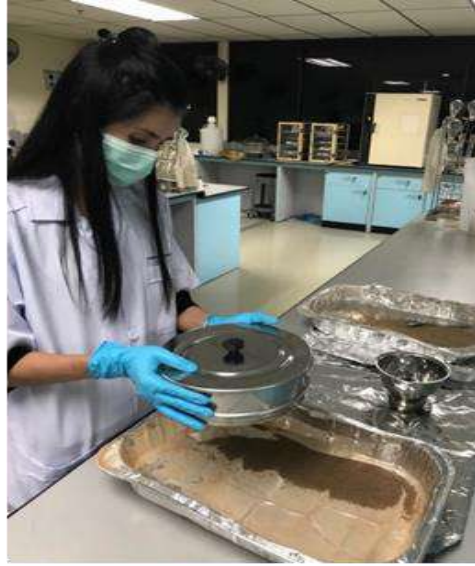


**3. Sediment and fish sample from Nan River**



**4. Sediment and fish sample from Ping River**





National Laboratory	Types/amount	POPs
Department of Agriculture (DOA)	Sediment/4	OCP
National Metal and Materials Technology Center (MTEC)	Sediment/4	PCB PBDE
National Institute of Dioxin (NID)	Sediment/4 Air samples/2 x 5 times	PCB Dioxin
Department of Medical Sciences (DMSC)	Fish /4 Beef 4 Egg/4 chicken and 2 duck Human milk/12 pooled samples	OCP PCB Dioxin
Faculty of Engineering, Mahidol University (MU)	Sediment/4 Water/2 Air samples/2 x 5 times	PFOS

# Capacity building in PFASs Analysis



- Sample preparation and extraction for the analysis of perfluorinated alkyl substances (PFASs) in water, mothers' milk, human plasma and air
- Assoc. Prof. Anna Kärrman
- Rudolf Aro
- @ the reference laboratory and toxicology center



# Capacity building in PFASs Analysis



Reference laboratory and toxicology center	Faculty of Engineering, Mahidol University	Department of Medical Science	Metal and Material Technology Center
Ms. Netnapa Chingkitti	Assoc. Prof. Dr. Suwanna kitpati Boontanon	Dr. Wischada Jongmevasna, Medical Scientist Specialist	Dr. Supamas Danwittayakul, Researcher
Mrs. Phattarakorn Pakaiphuek	Dr. Narin Boontanon	Ms. Aekgphoonnada Yenuthok, Medical Scientist	Mr. Suphachai Songngam, Lab assistant
	Ms. Sonthinee Waiyarat		
	Ms. Suratsawadee Sukeesarn		
	Mr. Jedsada Chuiprasert		
	Ms. Pichaya Piyaviriyakul		



# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region  
Project Country perspective: Tuvalu

Bangkok, Thailand  
4 - 5 April, 2023



# Summary of activities under the project

- Air sampling (Tuvalu Meteorology Office)
- Water sampling (Northern end of Funafuti Island)
- Milk sampling (Princess Margaret Hospital)
- National samples
  - Fish
  - Chicken breasts and legs
  - Egg
- Capacity building

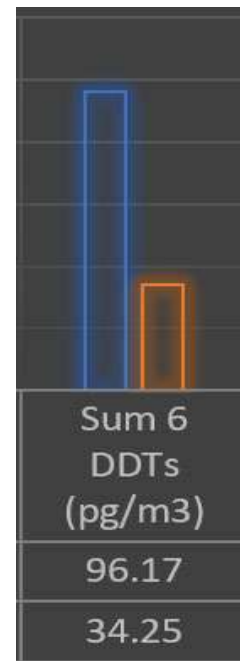
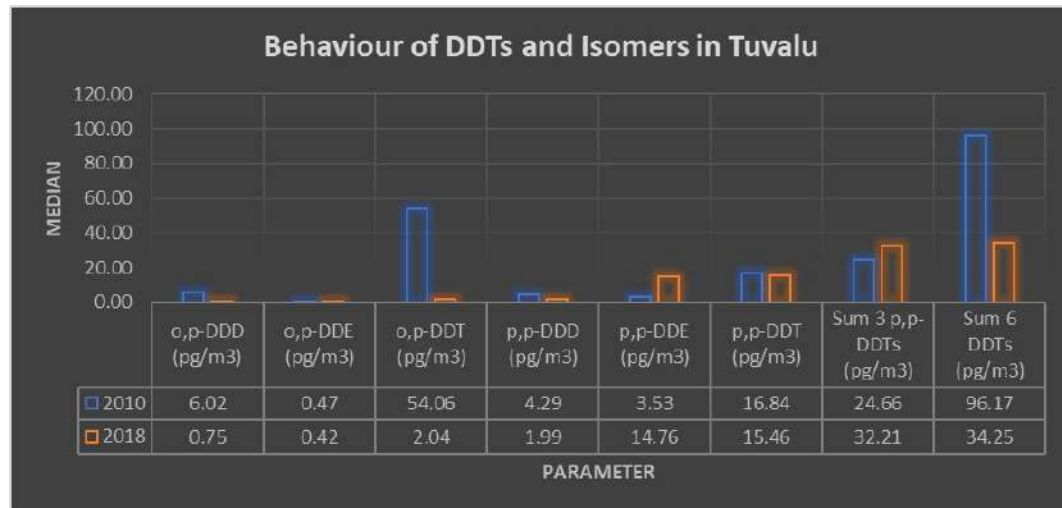


# Summary of main results and outputs

- Air sample:
  - DDTs and isomers
  - PeCB
- Water sample:
  - Perfluorooctanoic acid (PFOA): 18.75 pg/l
  - Perfluorooctane sulfuric acid (PFOS): 18.40 pg/l
- Human milk (2019):
  - 15 samples collected but got contaminated before sending for analysis.
  - Unable to continue due to Covid-19 restrictions



# Air samples of DDT & Isomers Comparison



# Awareness raising and policy engagement

Completion of GMP-II POPs Monitoring report.

- Identify the need to expand stakeholders
- Develop policy

National Implementation Plan on POPs

Chemical Management Policy still in the pipeline.

# Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building.

Regional: None but would like to have the opportunity to collaborate with other countries in the region

National: Limited awareness done, Need more awareness and effective ongoing monitoring. Monitoring of Used Lubricant Oil on main island.

# Lessons learnt and experiences gained

- Although results shows mild concentration of POPs
  - Means concentration will accumulate over the years
  - More exposure to POPs
  - The need to develop a chemical policy that would minimise POPs concentration
    - Pesticides
    - Other possible sources of POPs
- Need more capacity building due to high staff turnover within the Department

# Consideration for sustainability and future monitoring of POPs

- Need to continue POP monitoring
  - Proper packing of samples, to avoid contamination
  - Proper equipment and maintenance plans
  - Expand parameters of monitoring POPs
  - Training
    - Setting up of samples
    - Collecting data
    - Analyse data
- Awareness programs
- Collaborate with regional institutions, enable data analysis eg University of the South Pacific

# Thank you

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand

4 - 5 April 2023

## PORT VILA, VANUATU



## FINAL GMP2 UNEP MEETING

Overview of the outputs and  
outcomes of the UNEP/GEF POPs  
GMP project

BANGKOK 4<sup>TH</sup>-5<sup>TH</sup> APRIL 2023

ROSELYN BUE  
SENIOR OFFICER (CHEMICAL AND OZONE)  
DEPT OF ENVIRONMENTAL PROTECTION AND  
CONSERVATION

# SUMMARY OF VANUATU'S PARTICIPATION IN THE GMP2 PROGRAMME:

- VANUATU PARTICIPATED FOR THE FIRST TIME IN THIS 6<sup>TH</sup> ROUND OF POPS MONITORING, RESULTS MAINLY FROM 2018 AND 2019.
- THE FOLLOWING SAMPLES WERE COLLECTED AND SENT FOR ANALYSIS:
  - BREAST MILK
  - AIR
  - WATER
  - NATIONAL MATRICES (EGG, FISH, CHICKEN)
- VANUATU PARTICIPATED WITH OTHER PACIFIC ISLAND COUNTRIES IN A TRAINING ON DATA HANDLING AND INTERPRETATION
- AWARENESS RAISING IN COUNTRY



# SUMMARY OF MAIN RESULTS AND OUTPUTS

## AIR RESULTS

- Most of the OCPs in pg/m<sup>3</sup> except for mirex and hexachlorobenzene (HCB), show values below the limit of quantification (LOQ).
- All PFOS in pg/m<sup>3</sup> show values under the LOQ.
- Brominated compounds in pg/m<sup>3</sup> below LOQ except BDE209 with one very high value above LOQ
- @ and γ HBCD in pg/m<sup>3</sup> also show high values above LOQ
- Majority of PCBs had values in pg/m<sup>3</sup> above the LOQ.
- Very low PCDD/F and DL-PCBs in fg/m<sup>3</sup> were detected.

## WATER RESULTS

- All Perfluorinated POPs were above LOQ.
- PFOS levels highest



## BREAST MILK RESULTS

- Out of the OCPs , only Dieldrin (ng/g) was detected.
- For DDT (p-p-DDE) in ng/g, was detected above LOQ but low
- HCB (ng/g) was detected
- Beta hexachlorocyclohexane (HCH) in ng/g detected
- DL -Polychlorinated biphenyls (dl-PCBs) in ng/g detected PCBs) in ng/g detected in t
- TEQ values for PCDD/F-PCB in pg/g are above the WHO safety standard of 0.2-0,9 pg/g lipid.

# MAIN OUTPUTS

## 1. TRAINING AND NATIONAL REPORT

2021-2022 – VANUATU PARTICIPATED IN THE DATA HANDLING and INTERPRETATION TRAINING FUNDED BY GMP2 AND SUPPORT WAS PROVIDED THERE ALSO TO DO VANUATU'S GMP2 NATIONAL REPORT.

## 2. UPDATE OF NIP FOR POPs

2021 – THE GMP2 RESULTS WERE USED TO COMPLETE VANUATU'S UPDATED NIP FOR POPs.

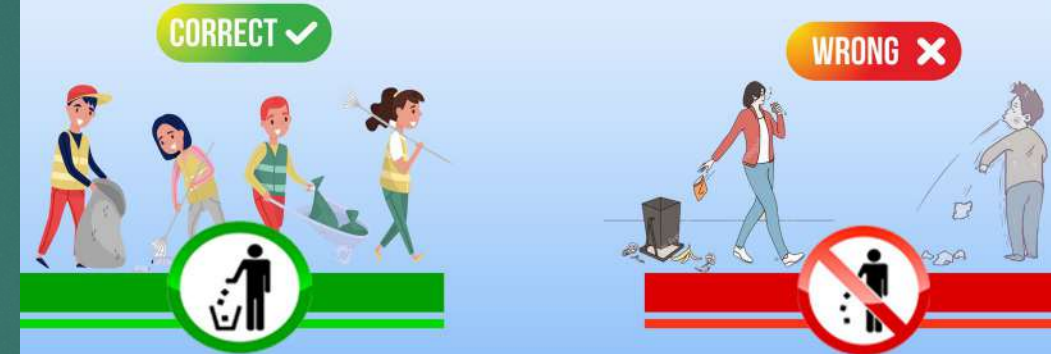
## 3. AWARENESS RAISING AND WASTE SEGREGATION, COMPOSTING, GOVERNMENT INPUT AND RELATED PROJECTS

DUE TO THE UNDERSTANDING OF POPS BY OFFICERS OF THE DEPARTMENT AND ALSO DUE TO THE GMP2 MONITORING PROGRAMME SHOWING SOME LEVELS OF POPS IN THE SAMPLES FROM VANUATU;

THE GMP2 FUNDS WERE USED TO START AWARENESS TO COMMUNITIES **ON WASTE SEGREGATION, TO NOT BURN PLASTIC WASTES, TO LEARN TO DO COMPOSTING.** THIS WOULD MAINLY TARGET MEANS OF MINIMISING RELEASE OF uPOPs. HOWEVER THE SEGRGATION WILL LEAD TO SEGREGATION OF E-WASTE AS WELL WHEN THE MEANS OF COLLECTING THEM IS AVAILABLE.



# SEGREGATE YOUR WASTE



**BE RESPONSIBLE, RESPECT YOUR ENVIRONMENT**



**HELP KEEP YOUR COMMUNITY CLEAN**

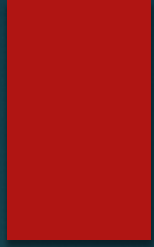
2020 - THE DEPARTMENT COLLABORATED WITH THE PORT VILA CITY COUNCIL (PVCC) TO USE THE CITY COUNCILS PIECE OF LAND CLOSE TO A SMAL URBAN MARKET TO BE USED AS A COMPOST PILOT FACILITY FOR THE ORGANIC WASTES TO BE COLLECTED.

THROUGH THE DEPARTMENT'S WASTE MINIMISATION POLICY, THE DEPARTMENT SUBMITTED A PROJECT PROPOSAL TO THE VANUATU GOVERNMENT IN 2021 FOR OVER \$30,000 FOR EACH YEAR FROM 2021-2025 FOR THE PURPOSE OF SUPPORTING WASTE SEGREGATION AND BEGINNING PILOT COMPOST FACILITIES FOR THE ORGANIC WASTE COLLECTED FROM URBAN MARKETS. THE DEPT CONTRACTED A LOCAL CONTRACTOR TO CONTINUE WITH THE WASTE SEGREGATION AWARENESS AND COMPOSTING OF ORGANIC WASTE.

The Local contractor contract was increased to \$90,000 using the DEPC, Environmental Protection budget to expand the work in 2023.







2022 – ONLY ONE SMALL URBAN MARKET AND THE LARGER MAIN PORT VILA MARKET

2023 - FOUR OTHER SMALLER URBAN MARKETS NOW INCLUDED

2023 – STARTING TWO COLLECTION POINTS IN TWO COMMUNITIES FOR WASTE SEGREGATION. THIS WILL INCLUDE ELECTRONIC WASTE FOR COLLECTION TO BE SUPPORTED BY THE GEF ISLANDS PROJECT FOR WHICH ELECTRONIC WASTE IS THE PRIORITY FOR VANUATU AND IS EXPECTED TO START THIS YEAR 2023.

2023 – WASTE SEGREGATION AND COMPOSTING AWARENESS AND TRAININGS BEING CONDUCTED ALSO TO AT LEAST 3 SCHOOLS IN PORT VILA AND 2 IN THE RURAL AREA.

2023 – WASTE SEGREGATION EXTENDED TO AT LEAST TWO MARKETS, TWO SCHOOLS AND TWO COMMUNITIES IN EACH OF THE SIX PROVINCES OF VANUATU

2023 – WASTE SEGREGATION AWARENESS EXTENDED TO BUSINESS HOUSES AND GOVERNMENT MINISTRIES TO INCLUDE ELECTRONIC WASTE TO BE AGAIN SUPPORTED BY THE GEF ISLANDS PROJECT WHEN IT STARTS. THE DEPARTMENT WILL USE ITS FUNDS TO BUY 2<sup>ND</sup> HAND 20FT CONTAINERS TO PLACE AT RELEVANT SITES FOR COLLECTION OF E-WASTE.

2021 – 2023 – THROUGH THE UNEP SPECIAL PROGRAMME PROJECT “STRENGTHENING THE NATIONAL INSTITUTIONAL CAPACITY FOR CHEMICALS AND WASTE’ PROJECT, THE COMPONENT ON DATABASE IS IN PROGRESS AND WILL INCLUDE PRODUCTS OF CONCERN INCLUDING PRODUCTS WHICH MAY CONTAIN POLYBROMINATED DIPHENYL ETHERS (PBDEs) AND HEXABROMOCYCLODODECANE (HBCD). THIS WOULD BE A MEANS OF AWARENESS TO IMPORTERS OF PRODUCTS WHO WILL HAVE ACCESS TO THE DATABASE TO BE AWARE OF PRODUCTS WHICH MAY CONTAIN THESE POPs.

2021-2023 – AGAIN, THROUGH THE UNEP SPECIAL PROGRAMME PROJECT “STRENGTHENING THE NATIONAL INSTITUTIONAL CAPACITY FOR CHEMICALS AND WASTE’ PROJECT, THE COMPONENT ON LEGISLATION, VANUATU NOW HAS A DRAFT DRAFTING INSTRUCTION FOR A CHEMICAL SAFETY ACT WHICH INCLUDES POPS.

WHEN IT IS WRITTEN AS A BILL BY THE VANUATU STATE LAW OFFICE AND PASSED BY PARLIAMENT, VANUATU CAN HAVE MORE CONTROL TO CHECK WHAT CHEMICALS ARE BEING IMPORTED INTO THE COUNTRY, INCLUDING IF POPS ARE BEING IMPORTED.



## CONCLUSION

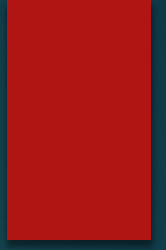
VANUATU ACKNOWLEDGES THE FUNDING FROM THE GLOBAL ENVIRONMENT FUND (GEF), THE UNEP TEAM, THE LABORATORY SCIENTISTS AND THE TRAINING INSTRUCTORS FOR THE GMP2 PROJECT.

A REALISATION THAT WE ARE LEARNING FOR SMALL COUNTRIES LIKE US IS THAT, WE NEED TO START IN SMALL WAYS TO HAVE SOME FORM OF SYSTEM IN PLACE TO SUPPORT OUR PEOPLE TO UNDERSTAND THE MANAGEMENT OF GENERAL WASTE AND INCLUDING WASTES THAT CAN RELEASE POPs. POPS ARE QUITE A TECHNICAL SET OF CHEMICALS, WE CAN TALK ABOUT THEM EASILY TO THOSE WHO ARE EDUCATED BUT ITS NOT EASY FOR A LARGE PART OF OUR POPULATION WHO ARE NOT TOO WELL EDUCATED TO REALLY UNDERSTAND. WE HOWEVER MUST START THE PROCESS OF SUPPORT FIRST THEN WE CAN COMMUNICATE MORE AS THE COMMUNITY PARTICIPATES.

SINCE IT WAS VANUATU'S FIRST PARTICIPATION IN THE GMP2 MONITORING PROGRAMME AND THE RESULTS DO SHOW SOME LEVELS OF POPs, VANUATU REQUESTS THAT THE PROGRAMME BE CONTINUED SO THAT VANUATU CAN PARTICIPATE TO MONITOR THE POPs LEVELS.

THE DATA WHICH WE HAVE NOW AND WITH THE COUNTRY REPORT, WE CAN USE THESE IN THE FUTURE TO SUBMIT TO OUR GOVERNMENT OR OTHER FUNDING OPPORTUNITIES TO REQUEST MORE FUNDS TO SUPPORT EXPANSON ON AREAS WE SEE NEEDS SUPPORT TO THE WORK WE ARE DOING AS WE LEARN ALONG THE WAY.

**THANKYOU**





# Overview of the outputs and outcomes of the UNEP/GEF POPs GMP project

Project country perspective - Vietnam

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific  
region

Bangkok, Thailand 4-5 April 2023



## Project countries perspective - Vietnam

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- Summary of activities under the project, including among others sampling, national analysis, capacity building, additional activities etc.
  - Summary of main results and outputs
  - Awareness raising and policy engagement
  - Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building
-

## Project countries perspective - Vietnam

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- Usage of the data/outputs of the GMP project, if any
  - What will be needed for better use of the data
  - Lessons learnt and experiences gained
  - Consideration for sustainability and future monitoring of POPs
-

# SUMMARY OF ACTIVITIES

- All sampling and national laboratory analysis were carried out by NCEM (VEA).
- Passive air sampling: sampling site at Ba Vi meteorological station; 96 PUF samples were collected through 08 period over 03 months; 48 were analyzed by NCEM, 48 were shipped to international expert laboratories (MTM Oerobro and VU Amsterdam).
- Active air sampling: sampling site at Ba Vi meteorological station; 05 high-volume samples were collected over 02 days; all were sent to MTM Oerobro and VU Amsterdam for analysis.
- Water sampling: sampling site at To Lich river and Kim Nguu river (Hanoi) and Dao river (Nam Dinh province); 16 samples were collected over 02 years (08 each year); 08 were analyzed by NCEM, 08 were shipped to MTM Oerobro and VU Amsterdam

# SUMMARY OF ACTIVITIES (cont.)

- 6<sup>th</sup> round of human milk survey: all mothers were chosen in accordance with UNEP's guideline; 55 individual samples were collected from 11 provinces/cities (then sent to MTM Oerobro for analysis of basic POPs, dl-PCBs and PFAS); a pooled sample was created by mixing 20 mL of each individual sample (then sent to CVUA Freiburg for analysis)
- Sampling of matrices of national interest: 16 samples were collected at Saigon - Dong Nai river (southern part of Vietnam) including 04 fish, 02 egg, 02 chicken, 02 butter and 08 sediment samples. The food samples were split into two parts, and the sediment samples into three parts. A total of 36 portions of samples were sent to MTM Oerobro for and VU Amsterdam for analysis
- Capacity building activities were cancelled due to a concoction of internal problems and COVID-19

# SUMMARY OF RESULTS AND OUTPUTS

- POP in PUF samples (passive air sampling):
  - OCPs: ranging from 17.9 – 55.1  $\text{pg}/\text{m}^3$ ; Lindane, HCB and DDT compounds are major substances
  - PCBs: not detected in 03/08 samples; only PCB-28 was detected in other samples, with highest concentration of 6.86  $\text{pg}/\text{m}^3$
  - PCDDs/PCDFs and dl-PCBs: ranging from 1.1 – 1.9  $\text{pg}/\text{m}^3$  for PCDDs/PCDFs (OCDD as the predominant congener) and 6.74 – 11.3  $\text{pg}/\text{m}^3$  for dl-PCBs (PCB-169 as the predominant congener)
  - PBDEs: ranging from 0.5 – 27.1  $\text{pg}/\text{m}^3$ , BDE-47 was detected in all samples (account for an average of 73% of total PBDEs)
  - PFOA and PFOS: mean concentration (based on 08 samples) of PFOA is 7.11  $\text{pg}/\text{m}^3$  (only detected in 03 samples) and PFOS is 0.25  $\text{pg}/\text{m}^3$  (only detected in 01 sample)



# SUMMARY OF RESULTS AND OUTPUTS (cont.)

- PFAS in water samples: mean concentration of 0.09 ng/L for PFOS and 0.63 ng/L for PFOA
- POPs in sediment samples:
  - PCDDs/PCDFs and dl-PCBs: ranging from 704 – 3,760 pg/g (TEQ from 5.2 – 14.4 pgTEQ/g for PCDD/PCDF, all below the threshold of national regulatory standard for sediment – 21.5 pgTEQ/g)
  - PBDEs: ranging from 1.63 – 10.3 ng/g (BDE-209 is the predominant congener, accounting for an average of 85% of total PBDEs)
  - PCBs and OCPs were detected but at concentrations below LOQs of labs
  - PFAS: ranging from <LOQ – 33.98 pg/g for PFOS and <LOQ – 56.86 pg/g

# SUMMARY OF RESULTS AND OUTPUTS (cont.)

- POPs in national pooled sample of human breast milk:
  - PCDDs/PCDFs and dl-PCBs: TEQ for all dioxin related compounds is 4.24 pg/g fat weight (OCDD and PCB-118 are predominant)
  - OCPs, PBDEs and other POPs: DDTs, HCHs and ndl-PCBs detected; HBCDs and PBDEs detected at very low concentration, other new POPs not detected
  - PFAS: sum of concentration of PFOS was 32.1 pg/g wet weight; PFOA was 13.0; L-PFHxS was < 5.5 (LOQ)
- POPs in other biological samples:
  - PCDDs/PCDFs and dl-PCBs: total TEQ ranging from 0.002 – 1.85 pg/g fat
  - PFAS: ranging from < LOQ – 61.73 pg/g fresh weight (PFOS) and < LOQ – 44.42 pg/g (PFOA)

# SUMMARY OF RESULTS AND OUTPUTS (cont.)

- Comparison with other regions (air samples):
  - OCPs: Lindane, HCB, DDTs concentrations are in lower range, but higher than in developed countries, consistent with other results in the past two decades
  - PCBs: concentration from this project is remarkably lower than other regions or other surveys in Vietnam
  - PBDEs: generally in lower range
  - PFOS and PFOA: much lower than other compared regions
- Comparison with other regions (water samples): markedly lower than other regions or other surveys in Vietnam

# SUMMARY OF RESULTS AND OUTPUTS (cont.)

- Comparison with other regions (sediment samples):
  - PCDDs/PCDFs and dl-PCBs: significantly lower than intensively industrial regions in other countries
  - PBDEs: generally in lower range
- Conclusion: POPs were detected in a wide range of samples, but not exceeding the threshold in national regulatory standard (if available)
- Valuable experiences with POPs sampling and analysis were gained by NCEM; unfortunately, not yet disseminated to others

# AWARENESS RAISING & POLICY ENGAGEMENT

- Awareness raising: mostly for the government
- Policy engagement: stricter regulation regarding POPs (old and new) were introduced in the new Law on Environmental Protection (2020) and other by-laws, somehow could be considered even stricter than required by the Convention (theoretically)
- Collaboration and synergies with other national/regional initiatives on POPs monitoring and capacity building: virtually none, outside the scope of this project

# USAGE OF DATA/OUTPUTS OF GMP

- For the government: these data were used as part of the push for stricter regulation regarding POPs in Vietnam
- For the public: virtually none, they have not had access to these results yet
- What will be needed for better use of data:
  - For the government: not much
  - For the public: we are open for suggestion

# LESSON LEARNT AND CONSIDERATION FOR SUSTAINABLE MONITORING OF POPs

- Increased quantity of new POPs
- Lack of technical capacity for POPs monitoring in Vietnam
- More national regulatory standards need to be revised/developed to include new POPs
- Other recommendations



# Thank you

Final meeting of the UNEP/GEF POPs GMP projects in the Asia and the Pacific region

Bangkok, Thailand 4-5 April 2023

